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ABSTRACT

In contrast to the mass-related verbal flow description given in part I, this report focuses on the cooperative interaction of textual agents and objectives in the production of information flows. Perspective Text Analysis (PTA) is used with the purpose of establishing their physical and functional significance in a non-mass based description of text building behavior. The most important feature of part II is the double aspect of the methodological approach to text building. One aspect of text building is an elaboration of Gibson's methodology into the study of a language-specific pickup of ecological invariants, exploring the abstract projections of ecological optics onto language spaces and the way in which projected optical flow fields constrain the coupling of perception and action, i.e. locomotor activities. The other refers to physical conditions as provided by the famous Visual Cliff experiments and their theoretical significance in an explanation of the established temporal morphologies. These have been represented within a topological space. This space is conceived of as a collection of points that are connected by affinity relations determining the As and Os of the AaO schema. It is shown that each point can be represented by a different number, and that the concentration of these points in the topological space ultimately becomes helical. It is also demonstrated that self-references and self-organization have significance for the embedding of the perceived topological properties of the experimental environment into text. The results of the analysis show that the ensemble of texts macroscopically is dominated by highly similar flow-field properties. Three figures, one table. An attachment contains cluster analyses. (Contains 15 references, 3 tables, and 1 figure.) (Author)

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Abstract

In contrast to the mass-related verbal flow description given in Part I, the present one focuses on the significance of the co-operative interaction of textual agents and objectives in the production of information flows. Perspective Text Analysis (PTA) is used with the purpose of establishing their physical and functional significance in a non-mass based description of text building behaviour. The most important feature of Part II is the double aspect in the methodological approach to text building. One is concerned with an elaboration of Gibson's methodology into the study of a language specific pickup of ecological invariants. It means an exploration into the abstract projections of ecological optics onto language spaces and the way in which projected optical flow fields constrain the coupling of perception and action, i.e. locomotor activities. The other refers to their physical conditions as provided by the famous Visual Cliff experiments and their theoretical significance in an explanation of the established temporal morphologies. These have been represented within a topological space. This space is conceived of as a collection of points that are connected by affinity relations determining the A's and O's of the AaO schema. It is shown that each point can be represented by a different number and that the concentration of these points in the topological space ultimately becomes helical. Finally it is demonstrated that self-reference and self-organisation have significance for the embedding of the perceived topological properties of the experimental environment into text. The results of the presented analyses show that the ensemble of texts macroscopically is dominated by highly similar flow field properties.

Of special significance for the intended information flow analysis is the observation that Gibson's theory of ecological perception encompasses the Kantian Schema concept. It constitutes the basis for Gibson's postulation of a genetically rooted mechanism of direct perception or information pickup. The primary interest of the present analysis of text building behaviour is therefore directed toward the couplings that the assumed schematising processes have established between the verbal flows and information flows in the Visual Cliff Reports presented in the Appendix of Part I.

To formulate and reformulate observations on the Cliff into language expressions provides the preconditions for an experimentally controlled functional analysis of kinematic work cycles that govern the co-operation and interaction of the textual agents. **Mending** of observations into text is dependent on this governing condition and has direct consequences for perspectivation and thus the cognitive functions to be performed by the A's and O's of the AaO schema which in turn generates the basis for establishing information flow gradients.

Morphological Invariance

In the Visual Cliff Reports, the researchers are the point of departure and the infant, who is being observed acting in various situations, constitutes the ecological event. Moreover, the experimentally modified environment has structure that can be perceived to the degree that the individual can incline his angles and shift his perspective until environmental invariants have been established. The individual's forward moves mean that his perspective on the environment is constantly changing. This means that the movements through successive arrays determine the **view-points**, i. e. the focal points to be picked up by the schematising mechanism of perception, namely the *eye*, and a **stand-point** determined by the *feet*, which have direct contact with the ground.

Similar to observed individual-environmental interactions a text backs up interactions in textual material by textual integrations. There is a certain determined textual array (a developmental field) for the invariants to form. The centre of such an array is a **phase singularity** or **point attractor** (B. Bierschenk, 1991 b), which becomes observable as the organising point where something singular happens. Because the dynamics of a text comes about through movements in text, additional point attractors establish **state attractors** (see Figure 2).

If and to what extent events on the action level can be perspectivated is dependent on the degree to which **view-points** have been distributed in and under the texture that determines the textual level. According to Gibson's theory, their embedding into a structure of affordances makes them perceivable. A verbal expression of an observation always marks the text producer's perceptual distance to what is expressed. What, for example, in one perspective is a viewpoint carrying properties of the **Figure (F-) component** of a text, may be a **stand-point** in another perspective. A standpoint may be conceived of as an attractant that draws or relates the viewpoint to reality. By means of this relational property, it is possible for the observer to define the relational scope of his observation.

For example, the curvature of the verbal flow trajectory describing the standpoints is characterised by a different kind of intervals compared to the curvature of the verbal flow trajectory describing the viewpoints, because the latter is defined by a greater number of viewpoints which appear many relatively short intervals. In contrast the intervals of the standpoints are longer and the distance of their dispersion is greater. This makes them independent of being processed as a property of the F-component.

Through shifting of perspective, the observer can determine the way in which viewpoints and standpoints are changing. Depending on the observer's position and sensitivity to an adequate spacing, the degree to which his viewpoints are tied to reality can be decided upon. Too widely diffused standpoints would mean the absence of a demonstrable path in the

Ground (Gr-) component. Thus there is a limit that parse text into text that is coupled to reality and text that is not. Viewpoints and standpoints are characterised by a mutual curvature of neighbouring deposits but exist as independent "**offer**" (Gibson, 1979, p. 139), and free from values and emotions. In combination, the F- and the Gr-components make up the basic co-ordinates of the language space (I. Bierschenk, 1992 a, b) within which the individual text develops.

Further, in and between those two points there may be an **aid-point** for the perspectivation, basically processed by the *hand*. It is namely sometimes necessary to use means to shift the perspective, especially when the viewpoint is an abstract figure of imagination. A conceptualized method, course of action or an instrument by which some ends can be achieved or an action supported is indicated by aidpoints. Aidpoints are defined on the basis of the Latin expression "adjutare" which means to give help. It is another relational property and signifies optional resource use. Aidpoints are distributed over a gradient that defines the **Means (M-) component**.

Just beyond the horizon is found the **set-point**, which cannot be fixed by the eye but conceived as goal for an action. Goal guidedness is influenced by the intentions in the text building behaviour as well as by the environment which constraints it. As a result, intended ultimate behavioural outcomes are distributed as setpoints over a gradient that defines the **Goal (G-) component**.

In the same way as those points are not always present in the individual's perspective, they show up differentially in text. As the individual moves along a certain perceptual path, he conceives of the objectives (F, Gr, M, and G) differentially. At one step they are given one specific function, at another step another function. In *walking*, for example, an aidpoint at one point in time becomes a standpoint at another, and the standpoint a viewpoint. It depends on the shifts and twists of the *body* as well as the *neck*. The dynamics of the perspectivation process lies in the field of tension where the information flow of the environment and the verbal flow of the individual meet.

Equivalence in Text Building Behaviour

The example presented in Table 2 of Part I has been chosen, because it nicely demonstrates that the swings of the pendulum produce a preferable steady state which the text producer has to detect if higher order components in the Gibsonian sense, like ecological invariants, are to be differentiated from a structure embedded in the experimental context. Further it demonstrates the point that the strings of graphemes inserted into the proper slots held by the dummies cannot be momentarily interpreted regardless of at what point in time they were processed. In contrast, a description founded on pure linguistic components augmented with a semantic component would allow the verb ('land') and similar verbs to be expressed without a point of observation despite the fact that the point of observation in ('land') or rather ('ground') is conceptualised into the action marking a generalisation which requires an explicit point in the single case. It is obvious that the ground plays an important role in the S- and F-systems. On the other hand in the E- and G-system, the point toward which the movement is oriented is implicit. But in an empirical observation "touch ground" needs to be made distinct by being differentially processed.

The amount of "stitching" of the texture (I. Bierschenk, 1992 b) carried out by the repair mechanism differs from system to system. Corresponding differences can be observed in the supplemented substances (i. e. textual material) and textural details. Concerning the F-system, it can be observed that its textural surface is most substantial and the textural details, shaping the spacing of textural elements and textural composition is more profound, compared to all other systems. The opposite holds true for the E-system. These variations should have some impact on the respective flow morphology. Provided that the intrinsic value can be expressed in a metric, informational invariants can be extracted from the flow. Because of the

binary character of the variables, a distance metric is the natural choice. Its task is to provide a principled account of the spacing of the events that characterises the steady state in the pendular clocking mode of text building behaviour. In setting up distance matrices an effort is made to account for the macroscopic properties of the relations reported in Table 2 of Part I.

The process of extracting the informational invariants requires that all strings of graphemes are tested for their distinctiveness. Table 1 illustrates this procedure.

Table 1.

Test of Distinctiveness of Strings of Graphemes

Objectives	*Dimensions*			
	S-system	E-system	F-system	G-system
Figure (50/30)	2/1	1/1	2/1	2/1
Means (70/30)			1/1	

The distance matrices are of the nxp type. In these matrices the rows take up the textual agents and the columns represent the textual objectives. The elements of such a matrix are a_{ijk} = one (1) for dependency and zero (0) for independence. Any particular sub-component of the objective is represented by matrix (k_j). If all objectives are adequately represented, this would mean that eight matrices can be set up and used in the grouping: Four are associated with the textual agents and four with the textual objectives. For that purpose Ward's (1963) method for a hierarchical grouping with the aim of optimising an objective function is used. The procedure developed by Ward allows an agglomeration of textual elements (n > 100) into specifyable groups. It begins with setting up as many groups as there are elements. Thereafter, the elements are reduced to (n-1) mutually exclusive sets of elements. A complete hierarchical organisation and quantitative estimation of the concentration of textual elements at any step in the grouping process is achieved on the basis of an ANOVA solution that computes the Error Sum of Squares (ESS). For a matrix of binary variables like those presented in Table 1 the ESS as criterion for clustering can easily be calculated and used as a very effective means in the establishment of the macroscopic properties of a system (Helmersson, 1992, p. 13). However, it is not meaningful to perform a calculation of ESS-values on a 1x1 matrix or a 2x1 matrix. The solution of clustering the rows of Table 1 will be searched for within the broader context of an hierarchical organisation of bifurcations in the Visual Cliff Reports. The result is presented in the Appendix of the present report.

The similarity in the number of unique strings of graphemes is obvious. The F-system shows a deviation with respect to the variation in the objectives. Because the focus is on quality and not on quantity, frequency counts are irrelevant. This may be demonstrated with reference to the E-system. The Blocks (2, 3) of Table 2 in Part I have identical strings associated with the agent and the objective component respectively which reduces necessarily the number of unique strings to one. Thus, their appearance and disposal over the three Blocks define the escapement in the broader context, the established groupings constitute the basis for a transformation of the state space of their flow gradients into a work space which is associated with the behaviour factor of that space (B. Bierschenk, 1991 a). In principle the processing of the example strings of the four different languages may seem very simple though in practice, it is a very complicated process to determine the outcome, because the behaviour factor gates or channels the flow potentials. This factor indexes the chained relations between the dummies. Evidently, operating **self-reference** results in work cycle and these tend to oscillate toward a balanced expression. By introducing new A-variables or by critical changes in the dependency relations, the work cycles can be influenced. But in order to form macro-

scopic states, two or more functional Blocks need become co-ordinated meanwhile conserving the asymmetrical relations of their microscopic states, i. e. their inner dynamics.

A large informational (non-kinetic) description of the diffusion fields of the viewpoints, for example, implies that structurally stable flows within the AaO-system can be characterised by flow gradients and their singularities. Macroscopic properties of the information flow regulate the "stepping mechanism", i. e. the forward and backward moves. This mechanism generates kinematic (irreversible) flows from a source to a sink according to the 2nd law of thermodynamics. Through transformational steps taken, physical body interactions become meta-physical, and dislocations become characterised by phase singularities continuing in depth. The convention of marking the degree of depth by the number of circles put around an embedded singularity has been introduced (B. Bierschenk, 1991 a). These characterise the path of the phase space also called the behaviour space. As shown in Figure 1 of Part I, a data point in the developmental field provides for the representation of the periods or amplitudes of a textual system.

Similarity and Divergence

The analysis of similarity between strings of graphemes is based on the concept of affinity which is measured by taking all matrix elements into consideration. Thus grouping takes its departure in the strict dependency of the variables of the A- and O-components. These are represented as a collection of points that are connected by affinity relations. The used measure of distance between these points relates the process of grouping directly to the construction of a state space. If each group in metrical terms can be represented by a different number this ultimately would imply a discontinuity and consequently a concentration of the data points in a space that would become helical. These numbers must represent a smooth curve of some integer winding number (> 1) (Prigogine, 1980; Kugler & Turvey, 1987, p. 47). Associating distinct groupings and their winding with names is synonymous with (1) naming the states of a system and (2) describing the dynamics of its state space. Thus, measuring this space refers to the dimensionality of a particular matrix and its density. Different matrices give rise to different structural relations, while diagonal matrices signal the absence of structure.

The dimensions shown in Table 1 indicate that the agent variables constitute the basis for grouping. In agglomerating the rows of the (50/30)-matrix pertaining to the F-system it can be observed that both variables of the O-component can be grouped into a homogeneous cluster. It is a striking fact that the significance of this solution can be demonstrated in the broader context of the Appendix, where the empirical definition of a cluster encompasses all 50-coded strings of graphemes. As a consequence of a decision on the truncation of the configuration of clusters, this cluster appeared as number seven.

The system variables. On the basis of the Aristotelian assumption psychologists commonly take for granted that text can be decomposed and classified by means of implicitly or explicitly stated (i. e. listed) critical syntactic or semantic features with clear cut boundaries. The basic idea behind this assumption is a hierarchically constructed physical system whose analytically defined elements easily can be organised by means of a classification scheme. This logic disregards the dynamics of the system and the fact that the interaction of its elements cannot be treated like bits in a puzzle but need to be understood functionally as "physical" elements of units of action. As such they have to be conceived of as constitutive of a behavioural style. In this sense, style consists of "producer-context" relations and their transformations.

The following two samples of text building may exemplify the way in which the transformations of style have generated system variables that are specific of the F-system:

64. ils s' contact avec le sol
65. contact

The numbers in front of the strings of graphemes refer to the cluster analysis of the F-component of the F-system reproduced in the Appendix. In the example it is obvious that the organism-environment relation and the directedness in this relation is in the focus of the text producer. Thus in a systemic sense, understanding the common basis of the information they carry, requires an investigation into their relational character within the Gibsonian approach to visual perception. The experiments on the perception of the surface of support (Gibson, 1979, p. 157) are of relevance in the search for their common intention (or meaning). His observation that "the perception of the ground and the co-perception of self are inseparable" is in agreement with the relational expression contained in these variables. "One's body in relation to the ground is what gets attention". Naming this cluster would have to capture the exceptional boundary condition of "impending collision" with a rigid surface reflection. It is in fact the surface that is the means utilised by Gibson with the purpose of studying "misinformation" (Gibson, 1979, p. 142).

Another constraint that restrains the use of information is specified by a cluster of the M-component of the F-system (see Appendix, Figure 2). An examination of its cluster configuration shows that the following string of graphemes constitutes its own cluster:

6. avec le sol

It is cluster number three which is the second in that configuration shown in Figure 2 of the Appendix. The information carried by its element (6) concerns "the ground outdoors" which is the "main surface of support" (Gibson, 1979, p. 156). This fundamental function of "support" should get its consideration in the naming of the cluster. Place of support or simply support is the proper and theoretically grounded name that suggests itself as capture of this constraint.

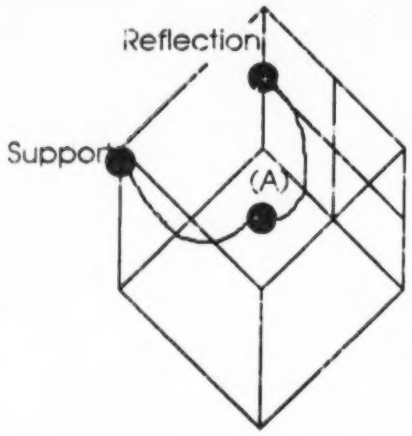
The essential observation that can be made on the F-system concerns the co-operation of the kinetic (physical) with the kinematic (informational) level. At the kinetic level individual textual elements are co-ordinated on the basis of a common agent, i. e. a viewpoint (65) and an aidpoint (6) are identified. Moreover, owing to the dynamic linkage defined over the blocks, functional grouping of textual elements, and thus greater functional integration, is achieved as shown in (64), where the agent, the viewpoint and the aidpoint co-operate within the structure of its string of graphemes. At the kinematic level, this results in many but distinct clusterings and significantly increasing control over the flow of information.

The terminal states of a system. A textual agent represents the steering part in a block and the highest stage of co-ordinative freedom. Its degree of agency or gravity in textual mass implies a certain degree of concentration in its action potential. This potential sets into motion the A-function which controls the scope of action associated with the movements in text. The scope is determined by a perspective. Because of the observed irreversibility in the perspective, some restrictions are put on the extent to which perspectivated objectives can flow. These restrictions concern the assignment of pointers and their algorithmic processing. In the flow, the objectives of highest order restricts the assignment of numerical codes to the following in falling order. Moreover, a pointer dislocated to the side of the agent marks the agent itself under the condition that it is not an initial string of graphemes. A further restriction lies in the coding based on a p-shifted verb. P-shift means that the agent part is automatically located in the space (X_p) which impose a reversibility on the objective part. In order to maintain the perspective implied in a passive construction the objectives shift their functional position

Supported by the experimentally observed variations in the verbal flow of the F-system, irreversible flow trajectories and their respective attractor states have been identified. How they act as exceptional boundary conditions on the action potential is demonstrated in Figure 1.

Figure 1.

Terminal States Acting as Constraints of an Evolving Information Flow



The cube symbolises the spherical property of a system. By placing a point anywhere into its space, a local concentration of what is conserved is identified. The point in the centre of the cube is marked with (A) which indicates the agents potential for action. In an abstract sense, this potential represents a *source* which is connected with a point in the background and at the left hand side of the cube. These two points are associated with two point attractors which represent sinks i. e. the terminal states. The curved paths form a physical link between source and the respective terminal state. From the perspective of the agent the terminal states refer to local minima where irreversible flow processes arise and produce explicit oscillations.

The agent's co-ordination of the state variables put constraints on the form of the dynamic processes involved and consequently on the co-operative interaction of these variables. Within the framework of Gibson's ecological optics (1979, pp. 65-66), this means that the ambient light is rich in action-related properties relative to a certain point of observation. In order to demonstrate his point, Gibson used an experimentally modified surface of support as a means for studying to what extent information on the structure of such a surface or its absence is reflected by light and picked up by children and animal. Thus the interactional outcome of the corresponding variables is restraint, because their co-operative interaction can only address the judgement of distance. Differences in substance and corresponding differences carried by light are picked up due to a macroscopic property that is significant over media. Both, the ecological invariant and the topological invariants of Figure 1 concern a morphological invariant.

Similarity of Terminal States. It is worth noting that the agent ('sie') in the G-system and the agent ('de') in the S-system co-ordinate two strings of graphemes each with functionally different clusterings compared to the F-system as shown in Table 2.
The calculated concentration of textual material shows that ('sie sich') appears as an element of a cluster (no. 28) in the F-configuration of the G-system, while ('mark') can be traced to a cluster (no. 26) of the F-configuration of the S-system. Finally the agent ('they') has governed a string of graphemes which appears as a member of a cluster (no. 25) in the F-configuration of the E-system.

All of them emerge near the end of the established work cycles. The cluster of the S-system has strings of graphemes that finalise with (Y) or consists of (Y). This grapheme represents an unknown O-variable. During processing it is inferred into an empty O-slot whenever the algorithm cannot find the proper textual material or a marked transition ends

abruptly. Further, the clusters of the E- and G-systems have a string of graphemes that contains an (X). This grapheme represents an unknown A-variable and is inferred into an empty A-slot under the following two (2) main conditions: An agent has not been identified and or the verb is not p-shifted. In the S-system this condition is tested by an endings dictionary. The first condition has two (2) alternatives: (1) A clause marker opens an empty slot before the verb or (2) a preposition in the initial position closes the slot.

Table 2.

Similarity of Terminal States

G-system	S-system	E-system
058. sie typisch ihre Beine und Finger	058. sig nära ytan	056. an awareness
060. sie anstelle dessen direkt	059. de typiskt ut ben och fingrar	060. close
071. sie sich ihren Müttern	061. **mark**	062. **they not over the deep side**
072. einige	069. sig sina mammor	063. not they over the deep side
068. Wenn X ohne Schutz der Glasplatte	070. många ut	065. down more attentively
057. **sie sich**	071. de inte glaset Y	074. to X into action by their mothers
	072. inte glaset Y	077. their mothers
	103. de Y	085. they the deep side
	113. de sin hemmiljö	090. they the sides of the border
	114. sin hemmiljö	091. the sides
		111. they about consequences
		112. they their home environment
		117. their home environment
		005. aware

In the first case the algorithm cannot find proper textual material between clause marker and verb, while it in the second case detects unmarked strings of graphemes between pointer and verb. The first case is an indication of experience and the second case, as exemplified by ('to X into action by their mothers') points at contextual (experimental) restrictions. This explains why the (X) appears here and there as part of a string of graphemes. Thus becoming ('aware') of an edge may be intentionally initiated by some "unknown" contextual agent who uses ('mothers') instrumentally in order to elicit actions, i. e. to lure a child into the action mode. The ecologically significant information carried by all strings of graphemes in Table 2 concern just actions related to a brink. Moreover, at the ecological scale the synchronisation of action and judgement of consequences is facilitated by experience which may be illustrated (e. g. 'they their home environment').

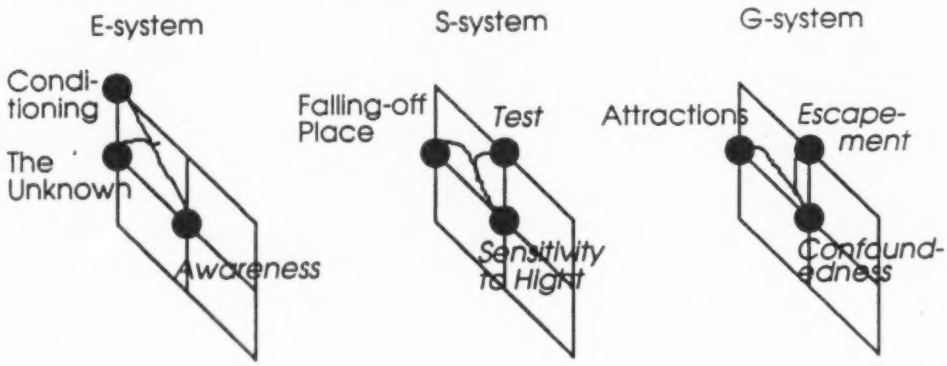
Because humans can directly perceive what is going or coming out of view as opposed to going or coming out of existence (Gibson, Kaplan, Reynolds and Wheeler, 1969), the child must have some method to analyse what is "offered" to him. That individuals make intentional

use of the information and move relatively to their surroundings (e. g. 'de typiskt ut ben och fingrar' ⇒ they typically out legs and fingers) or equivalently (they not over the deep side", or alternatively ('they the sides of the border') point toward "ego-motion " and ego-locomotion in the latter case. Both are encompassed in becoming ('aware') of a place where one can fall off. Thus the ecologically significant information to be abstracted from the intertwining of agent and objective concerns actions related to a dangerous place. By means of the functional similarity of twining together the agent with the objective at the language level and twining together the perceiver with the perceived discontinuity, common meaning emerges as a macroscopic property at the ecological as well as at the language level. As demonstrated, if clusters and their configurations can be named this would imply that existing morphological invariants can be communicated. Naming the clusters and the points from where they bifurcate provides for a topological representation of the behaviour space and thus the description of the dynamics of the systems.

The behaviour space of a system. Building on the convention of horizontal and vertical lines enclosing equal areas, a definition of the distance between point attractors and the direction of developing state attractors is presented in Figure 2.

Figure 2.

Topological Definition of a Behaviour Space



A three-dimensional space like that of Figure 1 can be formally defined by length as shown in Part I. A cubic slice of V is determined by the product of three intervals ($I^1 \times I^1 \times I^1 = I^3$). From a topological point of view V and I^3 are equivalent and represent one important factor of measurement. Winfree's (1980, p. 5) advice is to round off the corners of the cube in order to give the impression of a plane. Because it is natural and convenient to represent the direction in a three-dimensional space by a two-dimensional plane (S), development and orientation in Figure 2 have been specified as points on a plane. As shown, a Cartesian mesh has been imposed on the plane surface without due consideration of the second factor of measurement. The hills and valleys of the topology are absent. This means that the ESS-values of the cluster analyses have been held constant and consequently, distance and direction of the abstract spherical object of Figure 2 have been mapped in a constant manner.

By placing a point attractor at the intersection of the first vertical and first horizontal line, as for example in the E-system, a particular state is defined by the co-ordinates of the developing mesh. A network of this kind forms a Cartesian mesh of the Euclidean type (Kugler

& Turvey, 1987, pp. 15-17), which can be used with the purpose of outlining the way in which point and state attractors co-operate and interact within a topological space.

In the perspective of the text producer, perception of depth depends in part on a concept which specifies the conditions under which the perceiver notes what is "offered" to him and information pick up may take place. "Conditioning" refers to a set of experimental procedures that elicit a reflexive, primitive and autonomic behavioural outcome. "The Unknown", regardless of level of analysis, represents the event of an abruptly ending or changing surface or sentence. In both cases, one does not know, because information for support of an action is absent. The naturally resultant state attractor is the organisms' capability to be oriented to its habitat. Any point in the environment is a possible point of observation. In order to use these points, the organism must use some method to analyse what is "offered" to it, that is what comes into view. Since such an analysis is fundamental for survival of the species, the organism or individual makes intentional use of the information. It is, therefore, assumed that egomotion is encompassed in the perception of meaning. The perception of meaningful environments entails the co-perception of one's observer position in that environment. This is a perceptual activity that twines together the perceiver with the perceived in an interactive relation, without which the meaning of the perceived cannot be established. The relationship thus described can be changed, for example by objects or events changing colour or appearance, or by the individual changing his relative position. To be able to pick up information directly from those changes in view-point and perspective respectively, the individual perceives the physical event from which he abstracts the informational (ecological) invariants.

The purpose of this topological definition of the evolution in textual behaviour of the E-system is to demonstrate how the information flow in the system becomes transformed when the developmental process reaches and transits a second terminal state which forms another constraint. In the E-system this state has been named "The Unknown" because the string of graphemes in the underlying cluster consists of the grapheme (Y). Thus when the information constraint by the first terminal state becomes re-directed by the second constraint, the process changes direction and develops into a state attractor associated with a novel informational specification. This attractor addresses the perceptual trajectory of the person who must have a mechanism for direct information pick-up implying accurate synchronisation of his velocity to an aspect of the event of falling.

The evidently precise specification of the state attractor becomes further enhanced if one changes his perspective and considers the attractor as a source connected with two sinks that represent the out-flow of information. Obviously, the term *Awareness* is characterised by the velocity trajectory of the optical flow field that is isomorphic with the morphological invariant of the optical flow field. It specifies one's perceptual adjustment in approaching a brink (sink 1) and consequently a place where one will have to synchronise body movement and sight in relation to something dramatically with unknown outcome (sink 2).

From a formal logical point of view the specification of a topologically defined informational invariant means the description of a singularity representing the observed centre of a phase. Each time a transformative step can be performed, some oscillations as defined on the "adiabatic tracjectory" (Kugler & Turvey, 1987) can be observed. If the transformation from one state attractor to another produces a sudden unexpected, or an exceptional jump, a new phase comes into existence resulting in instability, i.e. a hysteresic path. The informational invariant of the E-system is the result of such a jump, which makes its outcome fundamentally different from an outcome of an adiabatic trajectory that reflects stability, i. e. a homorhesic path.

The "Falling-off Place" as current boundary conditions of the S-system has produced a state attractor that indexes a natural intimation to danger. What becomes orthogonal at this point in the development of the path concerns a definition (test and measurement) of visual

awareness of a "value-rich ecological object" (Gibson, 1979, p. 140). Most significantly, this quality is expressed by the macroscopic property of the S-system. According to Gibson (1979, p. 157) "to perceive a cliff is to detect a layout but, more than that, it is to detect an affordance, a negative affordance for locomotion, a place where the surface of support ends". The connection between the intimation of a person and his negative emotional reactions shows up in his intention to survive in a dangerous surrounding. Gibson and Walk (1960) regard *Sensitivity to Hight* as the proper behavioural reaction from which the meaning of the perceived could be inferred.

In the G-system the breakaway movements by "outsiders" is continuous with the design principles of self-organisation in dissipative field processes. In the experimental work individual subjects have reacted differently when positioned and locomoted at different paths, in part because of differences in the perspectivation of the attraction. Characteristic of this system state is that it is ambiguous with respect to the approaches it evokes from the experimental subjects. Because the mother holds great attraction for her child this places a "force" in her as desired object. A number of children felt that this force of attraction was greater than the attraction held by the cliff itself. With this constraint tied to the phase it transforms the developing process into an attractor state that represents *Confoundedness*. In the experimental work with the Visual Cliff, the researchers have failed to separate the physical from the emotional attraction with the result that their effect cannot be independently ascertained. It seems pretty clear that any sensible analysis of the behavioural reactions to the Cliff must appreciate that both sources interact in complex and dynamic ways.

Perspective transformation. Thus far the movements in text building and their units of action have been treated in a systemic sense as relations. On a common morphological basis, the AaO machine has assembled these relations through a gentle and self-referential cyclic pendular (clocklike) processing of nestings. The resulting organisation of assembled patterns of strings of graphemes into phase sequences and assemblies of phase sequences into topological configurations has to be conceived of as a certain kind of "resource" use supported by a specificational description of its invariants.

This approach, however, does not use up all the possibilities of PTA, because a person in the behaviour mode of text building applies a perspective to his efforts of putting together graphemes and string of graphemes. Because text building behaviour is characterised by intentionality, perspectivation introduces a certain directionality into the process. As demonstrated by means of the functional clause this intentionality is coupled with the agent part of the clause and consequently with a potential that causes "resource" distributions. A re-distribution of a conservation would mean a perspective transformation of the direction of the process that generated a focal topological configuration. This means that the AaO formalism can be used in the extraction of the focus of perspective contained in a verbal flow.

Because of the asymmetrical and transitive nature of the order that relates A-cluster to O-cluster, specific connectivity matrices (Helmersson, 1992, pp. 16-18) help identify precisely the dynamic state variables and the strict partial ordering of the states. Thus crystallising a system of A-variables is synonymous with identifying its "intentional" states. By inspecting the connectivity matrices it is possible to stipulate precisely the critical constraints that restrict at the thermodynamical level the pendular clocking mode in relating an A-cluster with an O-cluster. All A-clusters have to be presented as contiguous on the O-clusters before the invariants of the perspective transformation can be determined and extracted. So far, no automatic routines for extraction have been developed, but the connection matrices can be used in a manually performed solution.

Moreover, the distance between the perspective and what is perspectivated is uniform, because no metric has been associated with the co-ordinates of the respective mesh. Finally, by approximating the relationships among various parts of the established systems as unity in a plane, textual transformations, perspective or otherwise, can be symbolised by a snake trying to

bite its tail. Maintaining topographical coherence between the resulting mesh systems implies that they can be represented in cubic form. The cube is intended to symbolise the unity of text which becomes self-indicative through the snake's progress from one state to the next, and because the snake leaves a path, the nature of the information stored in the path is operationally defined over transformational changes in the path.

Results

Clustering strings of graphemes means grouping functionally similar strings. In this sense a group implies that textual details are ignored in favour of what is intentionally expressed, i. e. something prototypical or significant. The fundamental principles of intentionality suggests that textual elements at the mechanical level of language become **inductive** by their characterisation through grouping. Thus language mechanics and the establishment of natural groupings work complementary. While the kinetic level provides the recognised details, the kinematic level makes manifest what is significant. The results of these reciprocal actions are summarised in Table 3.

Table 3.

Number of Groupings and Levels of Significance

Comp	G	p	E	p	S	p	F	p
Figure	33	.063	26	.042	27	.282	30	.124
Persp.	11	.037	13	.072	8	.052	12	.037
Ground	12	.012	10	.026	12	.025	18	.006
Persp.	6	.038	6	.052	5	.021	5	.100
Means	2	.188	2	.188			3	.120
Persp.	2	.175	2	.175			2	.250

Based on the relationship of Action Potential (AP) and Processing Potential (PP) (in Part I, Figure 3) a four-fold table (with + + for G, + - for E, - + for S, - - for F) can be constructed. A χ^2 test shows that the observed distribution of Table 3 is not significantly different from what can be expected under the zero hypothesis concerning the Figure component, because ($p = .60 < 0.851 < p = .70$). The emerging number of clusters associated the Ground component ($p = .70 < 1.081 < p = .80$) is not significantly different either. This means that the rhythmic activity of text building behaviour has produced a number of groupings that can be expected under the zero hypothesis of negligible differences over systems. So far, it can be concluded that the empirically obtained constraints do not deviate from the theoretically expected states of the tested systems.

Similarity of Intention

Thus far, rhythmic activity of text building behaviour has been discussed and analysed in terms of AaO relations. An account has been developed of rhythmic textual activity based on nesting of AaO relations and dependencies that relate mechanical with thermodynamic properties. In addition there is an aspect of the AaO mechanism that generates an irreversible separation of textual material from its content which is intermingled in the original text. Therefore, the rhythmic activity in an AaO relation is not fully characterised by its nestings. After all, text production incorporates a perspective which refers to intentionality. It follows that rhythmic movement is directed by intentionality. It is therefore especially important to investigate similarity in intention as expressed by the content of the constraints. For that purpose, the fused patterns of strings of graphemes have been compared cluster by cluster

according to the protocols given in the Appendix (see Table 1). The degree of similarity is given in variance terms in Table 4.

Table 4.

Proportion of Common Variance in the Patterns of Strings over Clusters and Systems

Figure	S	E	F
E	.619		
F	.731	.856	
G	.465	.158	.280
Ground			
E	.752		
F	.707	.916	
G	.846	.897	.865

Stated broadly, the proportions of common variance presented in Table 4 are the expression of some divergence in the intentionality. As such they point toward various degrees of dissimilarity in content. Lowest are the proportions in the F-component of the G-system. This means that its patterns of strings of graphemes have a weak association to the patterns of the other systems. However, dissimilarity in content and formation of the constraints need not necessarily imply that rhythmic movement has produced divergence in informational specification of the respective profile. The physical conditions of the G-system seem to be further away from equilibrium compared to the others which allow a more intensive investigation into the character of the text. The resulting dissimilarity in content arises from within the G-system and constitutes the dynamical states through which the system performs its own informational specification of the phenomenon. Thus reciprocal action is caused by self-referentiality.

In contrast to the F-component, the clusters of the Gr-component go together more closely in their nonholonomic constraining/intentional content. This means that the patterns of strings of graphemes are linearly related to the proper cluster. These constraints, in turn, causally influence the way in which textual elements behave at the kinetic level. Moreover the thermodynamic states are governed and maintained by these same processes. The constraints of the Gr-component have grouped the textual strings of the alternative systems in highly similar ways, and produced similar configurations, Therefore, and for convenient inspection, this component's topographical profiles will be presented in the Appendix (see Figures 1-3) though without detailed discussion.

Specification of Information in the F-component

The main concern with the theoretical and methodological development and discussion of the previous sections has been the understanding of the actual process of movement in language and the instabilities in the verbal flow that arise out of the reciprocity of consciousness and textual material. Consciousness is induced and unfolds in the actual flow as an unbroken whole. In the following its implicate order will be explicated by means of topographical profiles. Because of technical considerations and a desire to keep the presentation within proper limits, the other components will be left out of the discussion. Each topological distinct layout of operating structural relations will be presented as a two-dimensional organisation.

The S-system.

Understanding the nature of reality inherited in the Swedish system presented in Figure 3, means understanding consciousness as a coherent whole. The transformational steps through the states of the system may be conceived of as a process that develops into an attractor state where the process manifests its highest form of synthesis. Naming this state implies naming the root of the F-component of the text. Thus at the centre of this configuration lies the "Schema" as the unifying theoretical aspect of perception and action. Branching out from this centre are two lines of reasoning. Both are rooted in the A-component of the AaO paradigm.

The A-component defines "Sensitivity" as something that is distinguished from sensation. Because perception according to Gibson in Reed and Jones (1982, p. 364) depends on information pick up and not on sensation, a "Test" of "Sensitivity to Height" requires the device of a new experimental approach that can control the "stimulus information" instead of traditional stimuli. In this sense a kind of history is introduced concerning the "Awareness" of occluded surfaces (Gibson, 1979, p. 308). Perceiving as a process extracts ecological invariants during exploration and locomotion. This means that the perceptual system generates orienting and exploratory motor adjustments that attunes the subject's movements to the particularities of the environment.

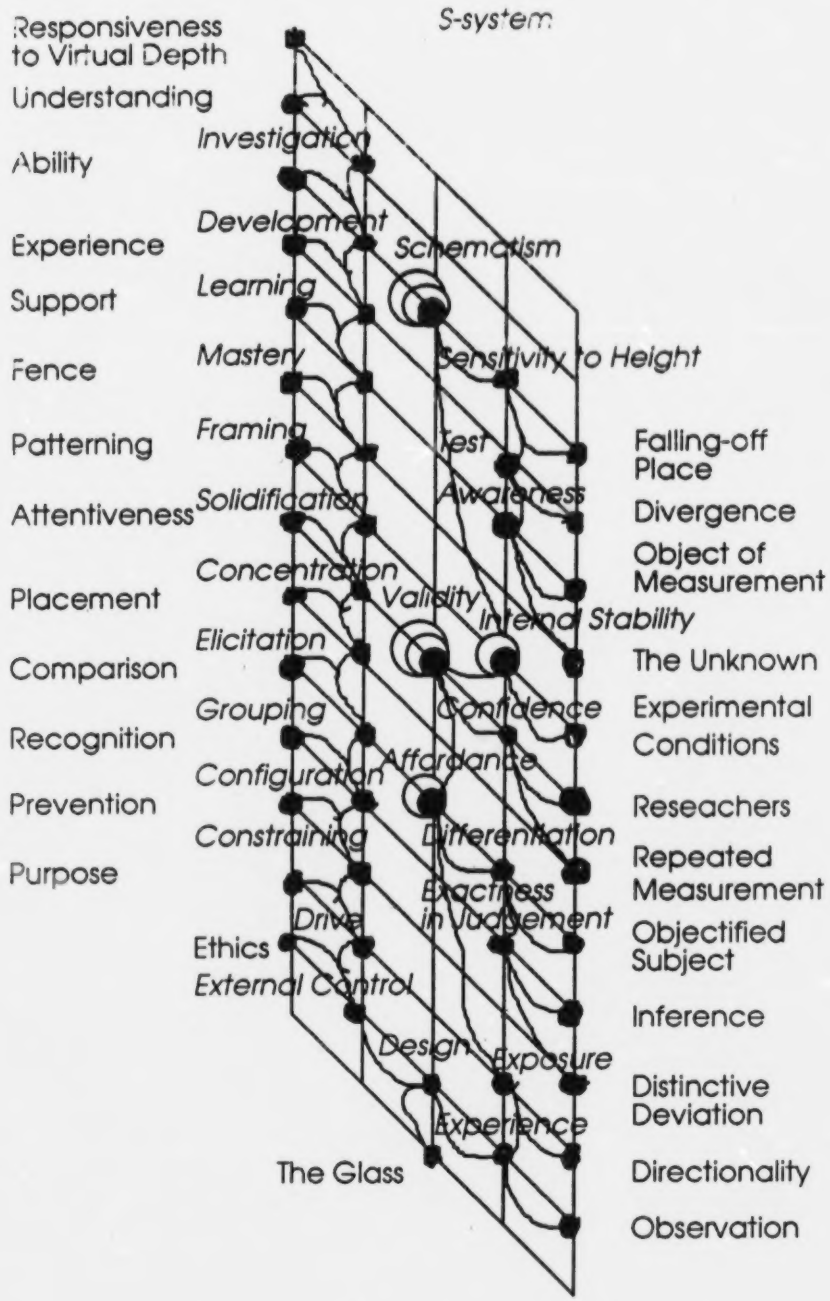
This reasoning extends the definition of the A-component over the other line. It includes "Internal Stability" as a "sensitivity to the self" (Gibson, 1979, p. 115) which means that a constancy function is complementary and indicative of a consciousness that is rooted in biology and thus outstrips the effects of learning in the given situation. This reasoning gets its support in the Gr-component which upholds "Experimental Conditions" as that part which is responsible for its establishment. It may be concluded that the organism's way of circumventing a risky situation is based on intended and oriented schematization that leads to a sense of "dangerousness" which may be conceived of as conceptual. Thus a concept results from non-material flows and thus underlies the organism's perceptual ability to recognise "danger" in novel situations. Though the A-component extends further into the other deeply rooted aspect of the configuration namely "Validity". Its left-side branch concerns "Confidence" in the biological functioning of the Schema in detecting information of ecological significance in the guidance and control of locomotion.

"Confidence" terminates in the "Repeated Measurement" of the "Researchers". To gain confidence requires a coherent narration which has to encompass lawfulness as well as an organism approaching the brink. Thus confidence can only be gained through a probabilistic emergence of a form of approaching a brink. This is based on regularity in change. For example, the Cliff makes sense only in relation to the size of the experimental subject (human or animal). In this sense, orderliness in behavioural development gives sense to instability defined as discontinuity in the experimentally modified solid surface.

Classical studies of "sense" perception presuppose an reductionistic approach while the schema approach assumes an irreducible representation of its O-component. A direct entry for explicating this component is given by the branch that leads from "Validity" to "Affordance". According to Gibson (1979, p. 36) the meaning or value of an environment consists of what it affords. A preventer of locomotion like the brink in the Visual Cliff experiments represents a negative affordance. What a brink affords a particular observer points to the other branch that leads to "Differentiation". Perceiving of the world begins with "Differentiation" and the pickup of invariants. This means that the perceptual process is progressively in greater correspondence with stimulation. Instead of becoming more imaginary it becomes more discriminating. Evidently, Gibson's theory of information pickup has no need of a memory. It needs to explain learning, that is the improvement of "Exactness in Judgement" with practice and the education of attention. The state of a perceptual system is altered when it is attenuated to information of a certain kind. The system has become sensitised. Differences are noticed that were previously not noticed and "Deviations" become distinctive that were formerly vague.

Figure 3.

S-system: Operating Structural Relations of the F-component



That "Affordance" has been defined "as properties of things taken with reference to an observer but not properties of experience of the observer" (Gibson, 1979, p. 137), has certain consequences for the design of an experimental environment. Because information pick up works two-way, their is no need for mentalistic attributes associated with the concepts of value and meaning (Gibson, 1979, pp. 140-141). Affordances are those aspects of the environment

that offer possibilities for behaviour which means that information specifying an affordance points both to the object and the observer exposed to the object. Thus the control of information in the stimulation leads to "Exposure".

"Exposure" is the highest point of a homorhesic path concerned with the preconditions of an experimentation that could yield a test of the theory of affordances which would radically depart from classical tests of existing theories of value and meaning. An integrated part of the unfolded path is directed toward the question whether and to what extent the basic affordances of the environment are perceivable directly and thus "without an excessive amount of learning" (Gibson, 1979, p. 143).

Visual perception of a surface layout in advance of behavioural contact with it refers to what it affords. Therefore, its specification by gradients, discontinuities and other invariants in the array of ambient light is part of experimental preparation. In order to find out the possibilities of such an environment to control the behaviour of an infant, the information in ambient light has to specify the negative affordance of the Cliff, which had to be framed in advance of experience and learning.

If the experimental subject can detect the gap or separation relative to its body, this is taken as indication of direct and immediate perception of its affordance for the subject. The meaning will be tacit no matter whatever words may be applied in the characterisation of an affordance. The hypothesis that misinformation of affordances lead to misperception and consequently inappropriate "Styles of Approach" is fundamental to the synthesis represented by the path in the Gr-component.

The E-system

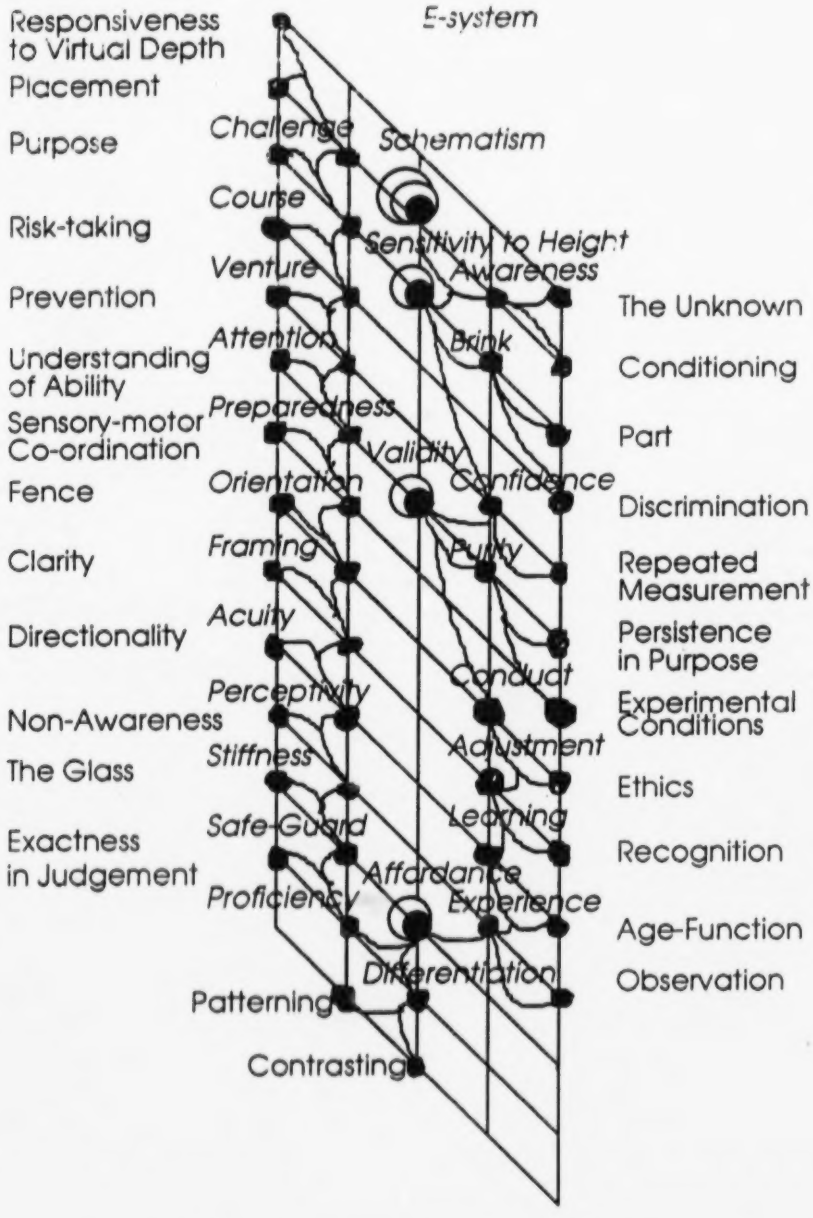
The centre of the E-system presented in Figure 4 is identical with that of the S-system. Two lines branch out from the centre and anchor the Schema in the A-component of the AaO paradigm. "Awareness" refers to the fact that the Gibsonian theory suggests that both "propriospecific" and "exterospecific" information pertain to an optic array and that both are responsible for becoming aware. "Sensitivity to Height" extends this definition of the Schema with two branches. The first one concerns one's existence (or need for survival) and thus one's ability to discriminate the edge of a cliff in an otherwise solid surface. The other addresses "Confidence" in the control of locomotion through detection of information of a certain kind. By detecting "the edge of danger" (Gibson, 1979, p. 37) it is expected that the infant guides and controls his locomotion. Since a brink is a limit of approach the visual system needs to be sensitive to distance between organism and brink (Gibson, 1979, p. 39).

Branching out from "Confidence" is a line that connects the term to "Validity", whose left hand branch concerns its intentional aspect, namely to gain "Purity" with respect to the infant's "sensitivity to the optical information that specifies depth downward at and edge" (Reed & Jones, 1982, p. 20). In discussing the validity of the results of an infant's "Style of Approach" and information processing, the reasons founded on the Gr-component (see Appendix, Figure 1) support another aspect of Gibson's position on perception and action. He explicitly refuses the conception of an "innate depth perception" as intended by Kant. Gibson asserts that experience and competence development may be helpful in the approach of "dangerousness". He argues, synthesis dependent on the information for a cliff that exists in the ambient light and that "the visual system first detects those features of the layout of the world that are important for animals and babies. (Reed & Jones, 1982, p. 20).

The right hand branch anchors "Validity" in its orientational aspect, which implies that the defining substructure is associated with the O-component of the AaO paradigm. Inherited in this substructure is the classical design of behavioural science with its necessary orientation toward "Adjustment" to the stimulus of a "dangerous edge". Increasingly more specific responses to it would manifest true "Learning" as controlled by the "Conduct" of the

Figure 4

The E-system: Operating Structural Relations of the E-component



experimenter. Insofar as learning processes have failed to materialise, measures to limit their behavioural consequences is a fundamental aspect of conducting learning experiments. This line of reasoning is supported by the path of the Gr-component. Moreover, "Experience" refers to the possibility that the experimental subjects already have acquired the meaning of a cliff, which means that learning processes have occurred in the past and essentially outside of what can be controlled experimentally by establishing stimulus-response contingencies.

Compared to the link in the S-system, "learning by doing" connects in a different way to "Affordance". This extends the discussion of this terminus to include the hypothesis that an organism may learn to perceive affordances or choose to be "unconcerned". From Gibson's viewpoint these are ecological and as such properties of the environment that the infant perceives or learns to perceive. The notion of affordance implies a description of the environment with an observer as part of it. Although defined relative to an organism, affordances of things are assumed to be independent of the need of the observer. In contrast, changes in the needs of the observer changes the value of things. Gibson assumes that affordance relations exist independent of consciousness, experience, or any other subjective state of the organism. The shallow part of the Visual Cliff offers solidity to hold the weight of the child. Gibson says this is so, because the thing is what it is, independent of whether or not the child realises the difference between a shallow and a deep side.

"Affordance" has two branches. One of them connects to "Differentiation". It implies that "solidity" as description of a property of the surface as well as inference are irrelevant for activity. What matters is the structure of the surface that is to be detected rather than to be constructed. Gibson's basic hypothesis in the Visual Cliff experiments is that a differentiation by contrasting the patterns over sides operationally defines this structure. For Gibson structure is patterned discontinuity in an optic array which implies that its stimulating effect consists of spatial and temporal relationships.

The other branch links "Affordance" to "Proficiency" which concerns direct detection processes. A surface layout has locomotory value relative to the "Proficiency" with which the child can co-ordinate his body movements with sight. When the child as observer perceives the possibility of locomotion, he perceives it in relation to the co-ordination he is capable of in his behavioural performance. Performance conditions are the fundamental in constraining the possibility of misperception. It includes the possibility that inadequate information is available or that the information is inadequate. Inadequate information may be optical information that is contradictory to haptic information. But it may be that the visual system is deficient in its functioning. Impaired information pickup may be caused either by immature visual systems or by the observer's failure to look around, or simply because he fails to notice the fine details. In this sense the brink of the cliff represents a challenge to the child at the crawling stage of locomotion. His "Style of Approaching" the surface of the deep side could be the result of any of these sources. This substructure of the experimental control of venturing out on a dangerous surface addresses the movement of the child in the process of perceiving.

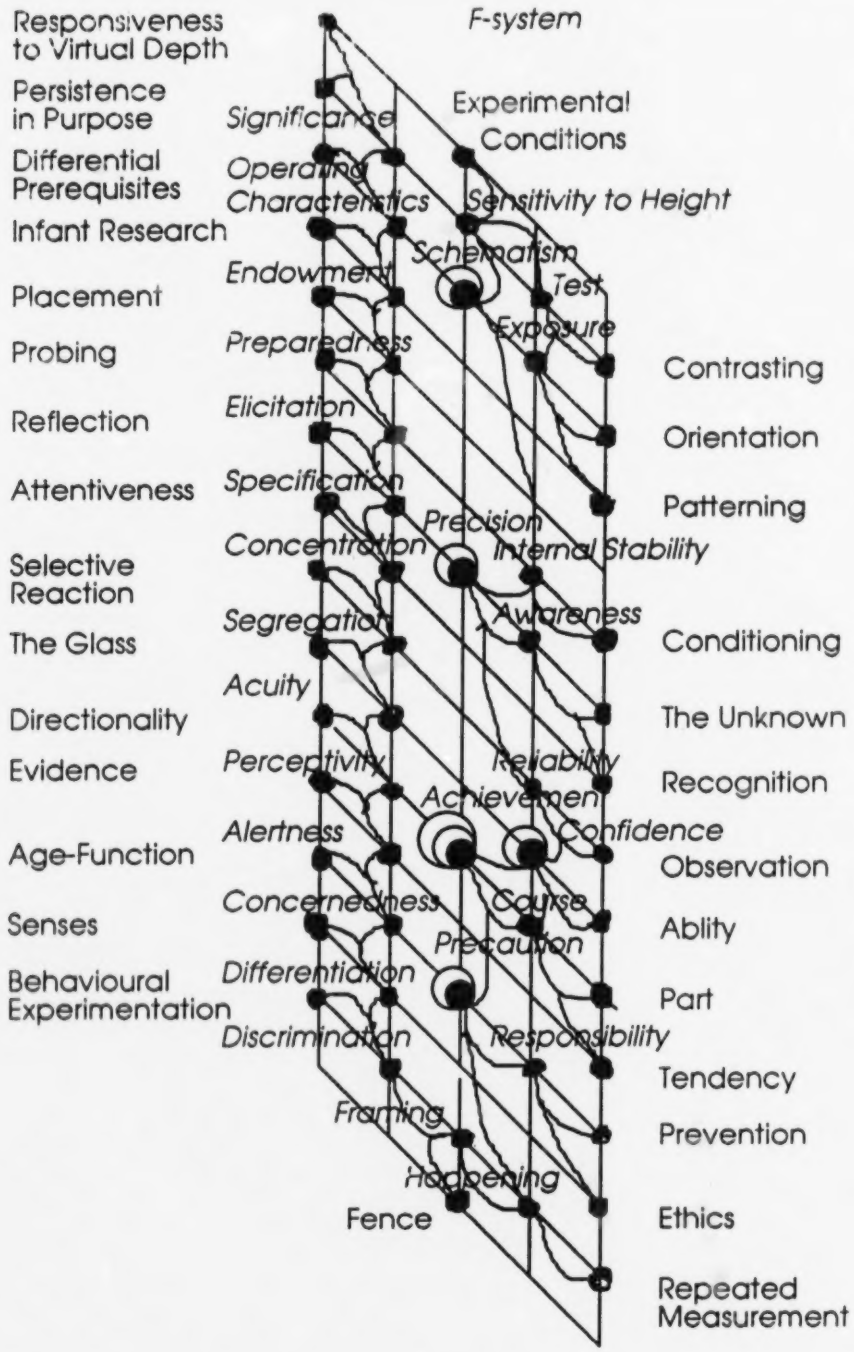
The F-system

From an operational point of view the "Schema" has the same function as in the previously discussed systems. It characterises the root of the phenomenon of ecological perception. This means that the fundamental principle of intentionality operating through the A-component of the AaO paradigm has individuated the F-system by characterising it in much the same way as the S- and the E-system. As presented in Figure 5, similarity refers to the final results of the transformations. These show that shifts in the characterisation have not changed the phenomenon. The process terminates inward in "Schematism" which means that the root is the same as in the S- and the E-system. Branching out from this centre are two lines that connect to similar but elaborated substructures compared to the preceding systems.

The left hand side of the branching leads to a structure that is concerned with "Sensitivity to Height" which terminates outward at one end in "Experimental Conditions" and at the other in "Patterning". Taken together, the point and state attractors constrain the path to the perception of a "falling-off place". For a child "exposed" to this place, touch is available to play some part in controlling "ego locomotion", but the contribution of "visual kinesthesis" Gibson, 1979, pp. 123-125) in this process requires a test of the child's orientation. Its aim is to decide whether the visual part in exploratory locomotion is as precise as its haptic part.

Figure 5

The F-system: Operating Structural Relations of the F-component



Because the proprioceptive function is fundamental in the child's orientation toward the environment, this substructure defines the "Schema" in a way that gets ample support in the Gr-component (see Appendix, Figure 2). This path leaves the impression of a watchful "style of Approach".

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In the same way as in the S-system, the right hand side of the branching includes "Internal Stability" into the definition of the Schema. Thus the function of proprioception introduces self-reference. Gibson (1979, p. 117) takes the word to mean "awareness of self" because he states: " The nose of the observer projects at the maximum of nearness and the so-called motion parallax of the nose can be determined under various conditions.

With it goes a link to "Precision" whose branches are anchored in the termini "Awareness" and "Reliability". It means that the perceptual system can function reliably only under the condition that environmental and organismic components work complementary. Essential to Gibson (1979, p. 184) is that there is information for co-perceiving the self as well as for perceiving the layout of the surface, because "visual kinesthesis yields the only reliable information about displacement" (Gibson, 1979, p. 125).

In general, the Gr-component supports the impression that the "Visual Cliff"-experiments are conceived of as "self-sensitivity" experiments which naturally connects to "Confidence" whose roots indicate that a child's ability of stimulating himself by basic learning activities such as crawling, looking, touching, or tasting are included in its definition.

The other line of the terminus extends its definition to include "Achievement" which is the most deeply rooted state of the system. Thereby it is acknowledged that ecological perception is an active, explorative and search-oriented process which aims at "Improvement" (obs. Gr-component) depends on a "Course" or path on which the activity of extracting the invariants from potential stimulation is achieved. Remarkable of this attractor state is that a split can be observed where the process bifurcates into the O-component of the AaO paradigm.

Active exterospecific information pickup puts a certain "Responsibility" on the part of the experimenters inasmuch as they have to take careful measures in making the performance of the child safety in his search for external stimulus information. But "Precaution" involves an attention to what is "Happening" to the child as the object of observation and measurement. Following Gibson, this terminus introduces the theoretically important distinction between "movement" of the child that refers to a displacement of the "self" and a sequence of events that refers to a displacement of the child as environmental object. The locomotory act of the child is a very significant event for the observer. When a child as a token of a biological system locomotes, the observer sees a "biological event" (Reed & Jones, 1982, p. 205) which Gibson conceives of as a fluid or viscous-elastic motion of a sequence of textured surfaces. When a sequence flows or in general deforms, its ecological occurrence is visually significant and need to be perceived. That a child repeatedly may suddenly move as a consequence of his paying attention to attractive goals in his environment, requires an adequate "framing" of his explorative activities. Thus "Precaution" represents the critical point where Gibson's theory of actions and events become distinct.

"Happening" describes the point where the homorhesic path becomes hysteresic. Its homorhesic part has much in common with that of the S-system. Likewise it is concerned with a conceptual specification of the presuppositions of experimentation with "Responsiveness to Virtual Depth". By directing attention to the importance of an informational specification of an optical cliff through the medium of light, the organism's sensitivity is placed in the centre of the approach. The specificational significance of the information contained in the medium is tested on the basis of the possibility that the organism may have been "endowed" with a mechanism that allows for an innate perception of "falling-off places" and consequent avoidance of them. The other hypothesis contained in the path implies that "Sensitivity" may be the result of learned perceptions. In this connection the performance oriented reasoning in the Gr-component is supported by the M-component (see Appendix, Figure 2), which implies" that Concernedness" may be conceived of as a "Style of Approach" that is the result of a habitual behavioural expression of past experiences with places where one can fall off.

The G-system

Gibson's theory of ecological perception is attractive because it provides a framework for experimentation with complex organism-environment interdependencies. The root of the graph presented in Figure 6 characterises an obvious intentional shift toward this methodological aspect, and thus the O-component of the AaO paradigm. The objective of expressing the interrelationship between organismic and environmental variables has generated an ecological model and led to a device which is capable of simulating its essential features in sufficient detail. "Simulation" individuates the characterisation of the root from which two lines branch out. One line connects it to the singularity "Demonstrative Definition" which identifies the simulation with measurement under "Experimental Conditions". It suggests that the behaviour of the "Object of Measurement" (human infants, animals) are studied in the laboratory in order to get control over the potential information in ambient light specifying the edge of a "simulated cliff" and the amount of depth at that cliff. The other line connects to "External Stability". It is the result of a constraint that represents an insistence on changing an otherwise dangerous environment into a flexible but rigorous simulation devise. The scientific method of behavioural experimentation insists on the test of hypotheses through rigorous but practical procedures. Providing "External Stability" implies that the values of the basic parameters of ecological information, e. g. amount of depth, can be simulated.

A line to "Inconsistency" extends the researcher's perspective and opens the path of argumentation to include further methodological considerations. One line branches out to a defining substructure that addresses inconsistencies in the behavioural data. The other branch lines up a substructure that relates to the inconsistencies in the experimental design itself. The Gr-component underlines this reasoning and stresses the aspect of mastery in the "Style of Approach".

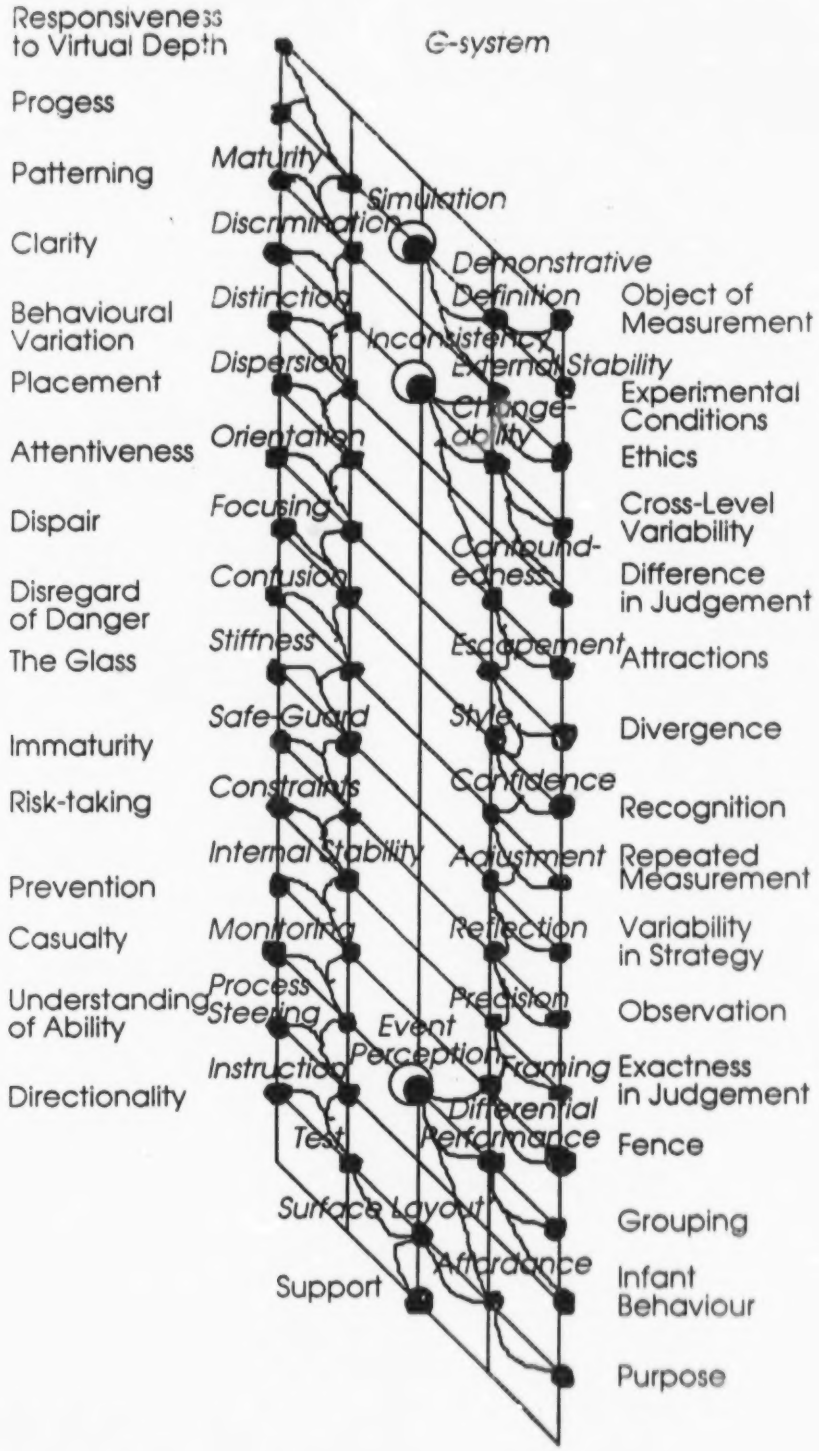
To begin with the left hand side, studies with many human infants at various levels of age and experience have shown that an infant at an impressible early age can discriminate depth, but this cannot be taken as evidence that the new-born infant is "innately endowed with the capacity to perceive depth" (Kaufman, 1974, p. 456).

The other inconsistency is associated with the original "Visual Cliff" experiments. The problem were introduced with the aim of the researchers to make the situation as similar as possible to those of everyday life of the infant. By introducing the mother of a particular child as part of the experimental set-up, but without controlling her effect, a loss of "Confidence" in the behavioural outcomes were generated.

Testing the child's "Escapements" and "Style" of "Adjustment" to the edge of a "Virtual Cliff" is therefore not a simple contrast effect that might give rise to linear "organism-environment" interactions, but rather give rise to a compound effect as a result of a change in meaning due to the value that a child associates with her mother. "Reflection" on this fact might lead to all sorts of inferences by the researchers. Depending on the degree of "Confoundedness" of the "visual" stimulation from the cliff and "emotional" stimulation through the mother, children may "fear to fall off the edge of the cliff" or disregard it. They might be said to perceive distance with "Precision", but do not interpret the cues to vertical distances in terms of falling. This is taken as reason for studying "Degree of Mastery" (obs. Gr-component) through careful "Framing" of the child's "action-event" involvement. The natural link is to the researchers conception of "Event Perception". If the behaviour of a child is conceived of as a series of viscous-elastic events, as was suggested in the F-system, this would mean that these are distinct from the abstract passage of time, which cannot be perceived. In contrast events at the ecological level are perceivable, because they occur in nested sequences. It is the nesting of events within episodes and episodes within episodes which generates a structure. Because sequences of nested episodes, like surfaces,

Figure 6.

The G-system: Operating Structural Relations of the F-component



have a texture, they are perceivable. The question of what information is available in the ambient light by means of which these events can be perceived branches out into two substructures.

The general hypothesis put forward by Gibson is that ecological events become specified by disturbances in the optic array. Information to be picked up inherits a regularity in change that is associated with a loss or gain of some of the neighbouring units in that array. Thus a child must detect permanent properties in relation to the disturbances in the persistent units. The left hand branch connects to "Differential Performance" in this respect, which means that the child must detect what comes in and goes out of sight as he moves. In contrast to proprioceptive kinesthesis, which is supplementary to visual kinesthesis, Gibson argues in Reed and Jones (1982, pp. 246-251) that the latter provides information about displacements. These 'disturbances" have their reference to the solid side of the Cliff. Depending on the child's discrimination of the textural variables, various potential paths for locomotion are available at the point of observation, and thus children may differ in their inclination to locomote, because they may differ in their capability to register these disturbances and consequently of detecting affordances.

From the point of the observer, the locomotions of a child are very significant events for perception. Gibson asserts that these natural events have affordance for the observer just as a falling-off place has for the locomoting child. Because a falling-off place is given by an abrupt change in the density gradient of an optic array, the natural linkage is to "Surface-Layout" In Gibson's theory of perception the classical concept of space is replaced by the layout of a surface. According to him a surface is the interface between a substance and the medium. A continuous substantial surface is not real for physics, but it is a primary reality for the behaving organism. A surface and its properties is perceived since purposive behaviour must be controlled by what the surface and its substance affords. But the experimental subject perceives its layout and what the invariants of layout afford. This means such geometrical properties of a surface as for example the edge of a cliff.

An experimental "Test" of ecological perception means mastery of an optical cliff as reported by Walk, Gibson, and Tighe (1957), which became the model for construction of a "virtual cliff". It refers to a floor that can be experimentally modified. The test was directed toward a sheet of glass that was horizontal instead vertical, that is, toward a glass floor. For the experiment to become "instructive" animals and children were placed on the surface under the following two conditions: One part represented a visible surface by virtue of textured paper placed just under the glass and the other part is invisible with the paper placed far below the glass.

The optical texture carried by light is reflected from the physical texture of the paper. It is expected that the texture projects to the observation point of the child and thereby not only "steers", but controls the process of perception and action. The external "monitoring" factor in this experiment consists of the restrictions put on the light carrying the information or meaning in case that "the geometrical reflecting solids given in the light, or specified by light" (Reed & Jones, 1982, p. 54) would not work in all cases to be tested.

For Gibson's theory "Internal Stability" is associated with the displacement of the "point of observation" either actively or passively. Proprioception in this sense refers to what Gibson calls "motion perspective". The child's displacements of himself in relation to one or the other part of the environment requires a discrimination of presence or absence of support. Feeling the surface is taken for support. "Constraints" on the displacements force the path taken by the child in a certain direction. The slightest shift in the point of observation, Gibson asserts, leads to a transformation of the entire illuminated environment and a whole new set of radiating paths becomes available for perceptual exploration. The conclusion seems to be that some infants, depending on "Maturity", may be less sensitive to optical information than others.

In this context, "Safe-Guard" means that those who depend more on inertial and tactical than on optical information for movement are secured by a large observation platform with a transparent floor through which the ground can be seen far below. This apparatus means that "Stiffness" or overriding the visual information in the optic array would not imply real danger for live. Though "Confusion" arises in many cases, because the optical information contradicts with haptic information and both with the emotional information associated with the mother behind the barrier of an absent ground. The visual perception of an absent ground and the co-perception of the self in this situation elicits signs of discomfort. Gibson argues that the retina of the eye is sensitive to optical transformations per se, but he suggests that discomfort is the result of higher-order variables that specify the edge of a cliff as "dangerous", but leaves out that these same variables may specify the mother as "security provider".

Thus "Focusing" on the "optic array" and the "information contained in light" is equivocal in several respects even though Gibson reports results with new-born or dark-reared animals attending the edge of a cliff that suggests the edge of a cliff is a feature of the environment that is highly significant. "Orientation" toward a cliff means detecting an affordance, but more than that, it is to orient oneself toward a place where one can fall off or a negative affordance for locomotion where the surface of support ends. Differences in orientation refers to "Dispersion" in the behaviour toward the centre board or the cliff respectively. In general, the experiments show that a child will not cross a vertical drop disproportionate to his body size, but will descend one in proportion to it as represented by the centre board of the apparatus. The child ventures over its edge but in general not over the edge of the cliff, presumably because of "fear of falling".

The glass-floor apparatus implies that an illumination of the environment is taken for granted and complete transparency is assumed, because otherwise an imperfect or dirty glass would invalidate the "Distinction" of information about the appearance and disappearance of a material surface. In Gibson's terminology, it can be stated that ecological optics is concerned with "many-times reflected light" in the medium, that is ambient light coming to a point in the air. This is profoundly different from radiant light leaving a point source. Hence a perfectly clean glass is a prerequisite for the child in order to "Discriminate" the information about the two edges of the shallow side of the surface.

Because the basic assumption is that this is not to be mixed up with abstract depth perception, but has to be understood as affordance perception, it has been fundamental to the research question posed, to investigate whether it is a capability that develops as the organism "matures". Perceiving the meaning of an edge in the surface of support, either a falling-off edge or a stepping down edge seemed to the researchers of the "Visual Cliff" experiments to have survival value, at least in the beginning.

General Discussion

The purpose with Part I and Part II of the present experiment has been to study the extraction of informational invariants through the couplings of verbal flows at the kinetic level of text production with information flows at its thermodynamic level. With reference to the first experiment it can be stated that its results are in agreement with the results of the second. Because the order relations between the four texts are invariant over levels, this result suggests that lawful kinetic properties govern the verbal flow that generates kinematic flows that in turn specify the kinetic properties. These interdependencies between the micro and macro levels of text production have been captured by means of AaO relations and their nested dependencies. However, lawfully working rhythmic activities have produced distinct topological configurations whose roots make them individual. Furthermore, it has been possible to give a theoretical characterisation of this macroscopic mode of organising singularities.

Depending on the competence of the text producer patterns of rhythmic movement have generated various significant groupings of patterns of strings of graphemes. This means

that the activities a person performs in producing a text are directed by his intentionality. This intentionality produces rhythmic activity in a relation, which is different from conventional classifications of relations by means of their attributes. When functionally similar patterns are agglomerated on the basis of intrinsic and irreversible processes, groupings become established, whose significance is conceptually indistinguishable from their constraining effects.

Finally, it should be emphasised that the purpose with the experiment has been to come to terms with the symbolic content of text production. The question to be answered by the experiment is, whether and to what extent PTA produces a kind of information that is different from what is commonly expected by "content analyses" of any type. In order to make clear that the "affordance" structure of a configuration of singularities is there because of physical conditions that are far from equilibrium and independent of the terms that have been produced, PTA had to be applied within a strictly experimental framework. For that reason "a state of the art" report of the famous "Visual Cliff" experiments served as fundamental condition and entry to Gibson's theory of ecological perception. In the present context, the task of this theory was furthermore to make possible the naturalisation of the intentionality of a given text producer.

Gibson's theory made it possible to give a theoretical characterisation of the termini of the corresponding graph. Moreover, all alternative constraints have produced termini of relevance within the framework of ecological perception. By contrasting the text building behaviour of the four subjects in this study, it was possible to establish experimentally that all four have reflected important theoretical aspects through their verbal descriptions of the Visual Cliff. From a functional point of view qualitative stability in text building behaviour is conclusively demonstrated. The individual variations observed only validate variations in the pronunciation of the informational invariants built into the experimental design.

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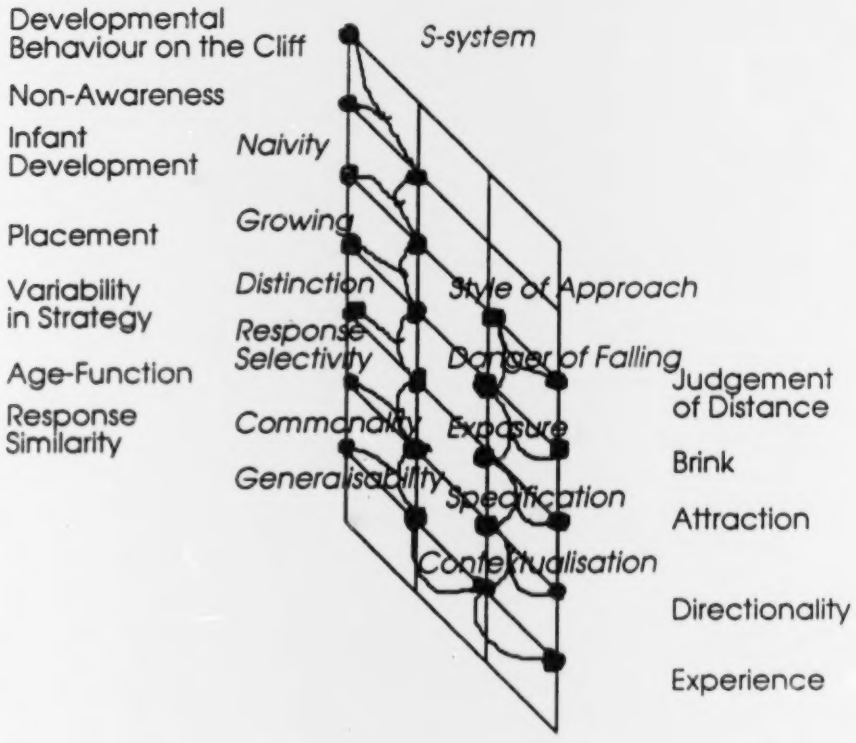
Appendix

Figure 1.

The S- and E-systems: Operating Structural Relations of the G-component



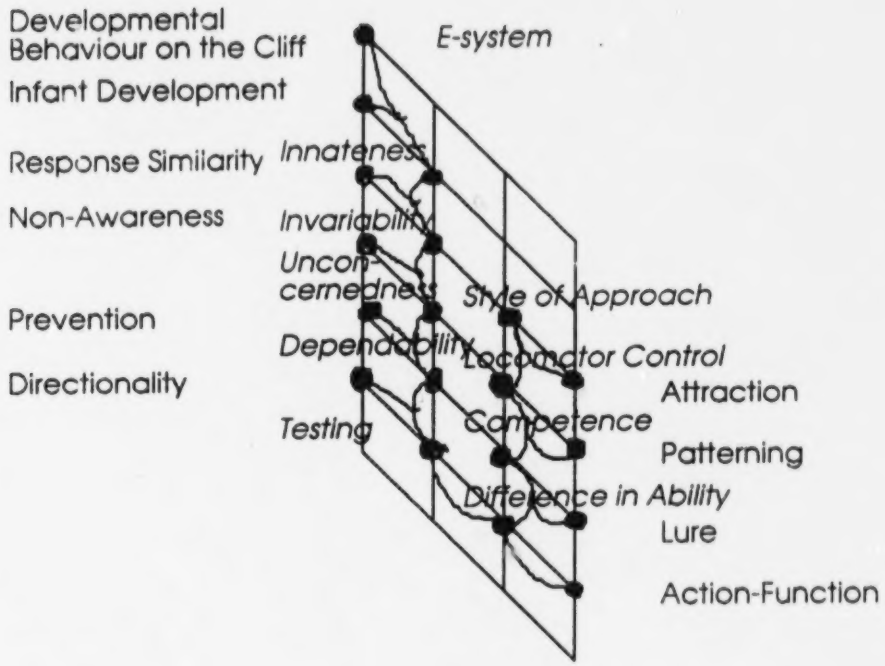

Developmental
Behaviour on the Cliff
Infant Development
Response Similarity
Non-Awareness
Prevention
Directionality
E-system
Innateness
Invariability
Uncon-
cernedness
Dependability
Testing
Style of Approach
Locomotor Control
Attraction
Competence
Patterning
Difference in Ability
Lure
Action-Function

Figure 2.

The F-system: Operating Structural Relations of the G- and M-component

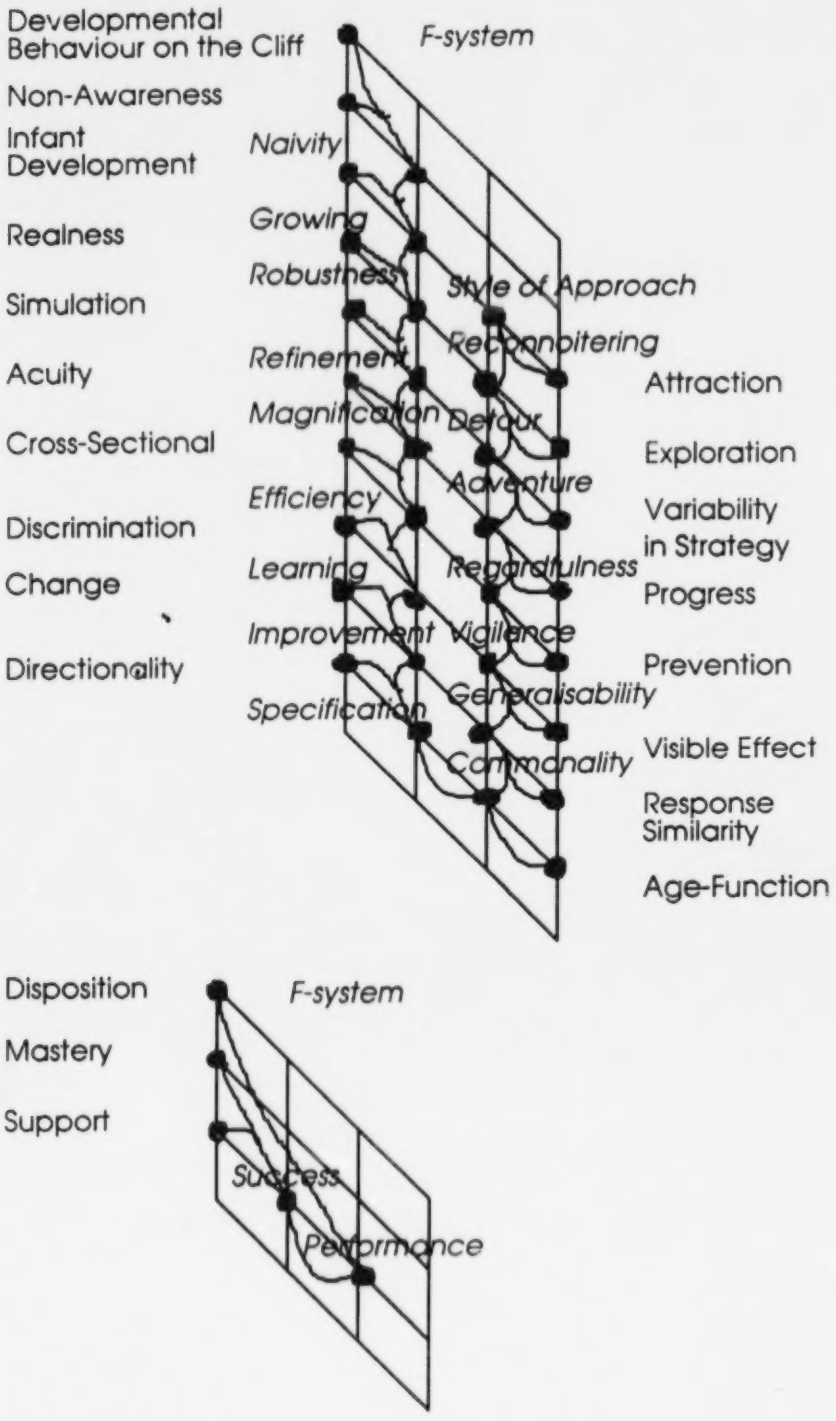


Figure 3.

The G-systems: Operating Structural Relations of the G-component

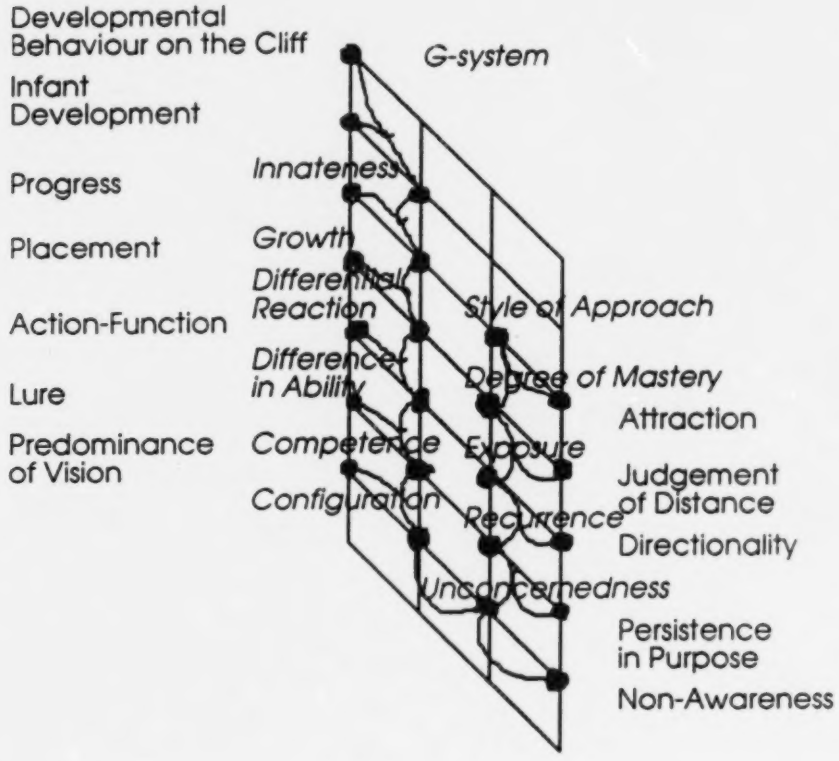


Table 1.

Summary of Similarity Counts of the Figure and Ground Component

S No	n	E No	n	F No	n	G No	n
Figure							
1	32	1	29	1	28	1	9
3	2		0	19	3		0
	0	4	2		0	12	2
5	2		0		0	17	3
	0	6	3		0	15	3
6	2	8	3	16	4	21	4
7	2	14	3	26	2	3	2
9	2	2	2	5	2	6	2
	0	15	2	28	2		0
	0	17	4	13	3		0
11	2	18	4	22	4	26	5
12	2	5	2	19	2	13	2
13	3	3	2		0	18	3
14	3	19	4	18	3	31	8
15	3	12	3	10	2	10	2
16	4	16	4	21	5	23	5
17	4	10	3	11	2	16	3
18	2	13	3		0	22	4
19	1		0		0		0
21	5	22	5	17	4	25	5
23	11	20	4	25	13	32	10
24	8		0		0	27	6
	0	21	3	2	2		0
25	1	26	1	23	1		0
26	1		0		0	33	1
	0	25	15	24	12		0
	0	24	1	22	1		0
Ground							
1	20	1	27	1	22	1	17
2	2	4	2	2	2	8	2
3	2	2	4	3	2	2	2
4	2		0		0	4	2
	0		0	15	3	3	2
5	2		0		0	16	3
6	2		0	11	2		0
7	2	3	2	12	2		0
	0	7	3		0	5	2
9	4	6	3	10	2	10	3
	0	8	3		0	6	2
10	4	10	9	18	11	12	7
12	8		0		0	11	4

Cluster Analyses

Swedish: Figure Component
Cluster 1: Responsiveness to Virtual Depth
5.medvetna
7.En grupp forskare i detalje beteendet hos småbarn i dess situationer
16.sig mest
20.X i ett hem till exempel

31.genom en mittbräda
35.ett utseene
37.ett stycke
38.7cm stora rutor
39.intrycket
43.X under mittbrädan
45.mödrar
46.gruppen
49.tre grupper
64._när X de på ytan av den djupa sidan
65.en tidig krypålder, fem
66.X av sina mödrar
68.barnets mamma
73.det många småbarn
74.sig bort
75.diagonalt
80.mindre an hälften av gruppen
konsekvenserna
92.sitt beteende
97.småbarn i samma ålder sig olika i vissa avseenden

98.sig olika
99.det klart
100.synen mycket tidigt
106.påtagligt
107.ögonen som småbarn först
108.situationer
109.inte förän de
110.uppenbar

Cluster 2: Understanding
8.Forskarnas målsättning en bättre förståelse av utvecklingen av framsteg hos småbarn
9.en bättre förståelse

Cluster 3: Ability
10.deras förmåga
11.kroppen och

Cluster 4: Experience
23.en experimentell omgivning upplevelsen av ett fall för ett litet barn
24.upplevelsen

Cluster 5: Support
26.en glasskiva
27.ut som ett 1.80x1.40m stort bord
Cluster 6: Fence
28.ca 1m hög
29.en 20cm hög kant

Cluster 7: Patterning
32.ett stycke tyg
33.0.5cm stora rutor

Cluster 8: Attentiveness
54.dessa småbarn
55.de varseblivning

Cluster 9: Placement
56.dess småbarn en person dem långsamt ner till en punkt strax ovanför glassytan på de båda sidorna
57.en person dem långsamt ner

Cluster 10: Comaprison
79.denna åldersgrupp skillnaden
96.småbarns beteende mycket gemensamt

Cluster 11: Recognition
101.att de flesta småbarn
102.igen signaler

Cluster 12: Prevention

111.Vidare studier av denna process till hjälpmedel

112.att X småbarn för fara

Cluster 13: Purpose
82.krypålder
83.Småbarnen i sent sitt sätt
84.sitt sätt

Cluster 14: Ethics
17.sinnen det lilla barnet sig mest oetiskt
18.oetiskt
19.småbarn

Cluster 15: The Glass
76.också
78.det Y
77.glaset

Cluster 16: Observation
1.Många föräldrar, som noga sina småbarn i krypåldern
2.sina småbarn
3.antagligen
4.dessa i början över kanter av
olika slag utan medvetna om risken

Cluster 17: Positioning
62.de istället direkt
63.de mer uppmärksamt
94.de äldre småbarnen
95.de snabbare hjärtslag där än

Cluster 18: Distinctive Deviation
104.det lika tydligt, att deras förmåga
105.sig markant

Cluster 19: Inference
81.konsekvenserna

Cluster 20: Objectified Subject
60.sig

Cluster 21: Repeated Measurement
50.dessa grupper
51.Genom att X beteenden
52.beteenden
87.dem
88.sina försök flera gånger
89.forskarna tydligt
90.småbarnen bedömningar

Cluster 22: Researchers
21.forskarna

Cluster 23: Experimental Conditions
12.Dessutom de
13.grepp
14.syn och kroppsrörelse
22.upp en experimentell omgiving
25.Dig således en anordning
34.direkt
36.Denna sida därför den grunda sidan
42.lampor X under mittbrädan
47.X beteendet hos över 600 småbarn
48.beteendet
67.Varje småbarn

Cluster 24: Divergence

30.det lilla barnet
41.oregelbundenheter
44.ljusskillnaderna

53.forskarna märke
85.sin mamma
86.sidorna
93.risken
40.den djupa sidan

Cluster 25: The Unknown
6.Y
Cluster 26: Object of Measurement
15.de

Cluster 27: Falling-off Place
58.sig nära ytan
59.de typiskt ut ben och fingrar
61.mark
69.sig sina mamor
70.många ut
71.de inte glaset Y
72.inte glaset Y
103.de Y
113.de sin hemmiljö
114.sin Hemmiljö

English: Figure Component

Cluster 1: Responsiveness to Virtual Depth
7.A group of researchers in
detail the behaviour of infants in these
situations
11.the development of sight in this process
17.the most
24.an experimental environment
for the infant the experience of Y
25.a device
26.like a large six-by-eight-foot glass-topped
table
30.X into two by a centre board
35.the appearance
36.this side the shallow side
39.the impression
44.X under the centre board
46.In the experiment, mothers X
with their infants in a number of activities
55.these infants alternatively
59.them down
61.their legs and fingers
64.instead, they directly

66.these very young infants not on the surface
of the deep side
80.away
81.diagonally
84.the presence
86.the consequences

95.judgements
98.faster heart-beats there than
99.much
100.differently
101.evident
109.situations
110.not they about consequences
113.obvious

Cluster 2: Placement
57.too young
58.the researchers slowly them
down to a point just above the glass surface of
both sides

Cluster 3: Purpose
87.the late-maturing crawlers their way of the
deep side
88.their way

Cluster 4: Risk-taking
96.their behaviour
97.the risk

Cluster 5: Prevention
114.Further studies of this
process to means of infant's exposure to danger
115.infant's exposure

Cluster 6: Understanding of Ability
8.The researchers' goal a better
understanding of the develop-
ment of progress in infants concerning their
ability
9.a better understanding

10.their bodies, and the role

Cluster 7: Sensory-Motor Co-ordination
12.Moreover, they a grasp of the
development of judgement in
infants in relation to the
problem of sight and body
movement
13.a grasp
14.sight and body movement

Cluster 8: Fence
27.an eight-inch high border
28.the infant
29.off

Cluster 9: Clarity
41.anomalies
42.X lights under the centre board
89.their mother

Cluster 10: Positioning
67.not these very young infants on the surface of the deep side
68.these very young infants on the surface of the deep side
69.their heart-beats

Cluster 11: Non-Awareness
15.Finally, they out on senses the infant the most
16.out
78.several it not Within this group, any infants X away from their mother for the glass
79.it not Within this group, many infants X away from their mother

Cluster 12: The Glass
82.also
83.the glass
76.it

Cluster 13: Exactness in Judgement
106.equally evident that their ability
108.markedly

107.consequences

Cluster 14: Patterning
31.a one-quaerter-inch
33.X flush against the undersurface of the glass
32.pattern

Cluster 15: Contrasting
37.a three-inched
38.X upon the floor forty inches below the glass-top

Cluster 16: Observation
1.carefully
2.their infants
3.Many parents that, initially
4.that, initially

Cluster 17: Age-Function
70.Infants an early
71.age, five
73.use

Cluster 18: Recognition
102.very early
103.that most infants
104.clues

105.sight Y

Cluster 19: Ethics

18.senses the infants the most unethical
19.unethical
21.to X in a home for example
20.infants

Cluster 20: Experimental Conditions
22.the researchers an experimental environment
23.an experimental environment
54.that_when X these infants alternatively over the shallow or the deep side
94.clearly

Cluster 21: Persistence in Purpose
47.Over the years, the group
49.the behaviour
48.able

Cluster 22: Repeated Measurement
51.these groups the researchers
52.By X various behaviour

92.them
93.their way several times

Cluster 23: Discrimination
34.flush
43.lights X under the centre board
45.the illumination
50.Several observations
75.Each infant

Cluster 24: Part
40.the deep side

Cluster 25: Conditioning
56.an awareness
60.close

62.they not over the deep side
63.not over the deep side
65.down more attentively
74.to X into action by their mothers
85.they the deep side
90.they the sides of the border
91.the sides
111.they about consequences
112.they consequences
116.they their home environment
117.their home environment
5.aware

Cluster 26: The Unknown
6.Y

French: Figure Component
Cluster 1: Responsiveness to Virtual Depth
6.conscients
8.Un groupe de chercheurs en
détail le comportement des petits enfants
9.mieux le développement es
grogrès chez les petits en ce
leur aptitude à leur corps ainsi que le rôle
34.X côté peu profond
38.une impression

46.X sur la plaque de la table
53.ces groupes
58.les petits
61.lentement jusqu'
63.leurs doigts et leurs jambes
70.pas leur rythme cardiaque ne pas d'un côté à l'autre
76.Chaque petit sur la panchette centrale
77.tour
80.Un bon nombre d'entre eux en diagonale
86.ils se le côté profond

88.conscience
89.les consequences
93.leur mère

101.leur comportement
102.le risque

105.beaucoup
106.différemment
111.aussi évident que leurs aptitude

112.à les conséquences de leurs déplacements

113.les conséquences
114.les petits se d'abord à leurs
yeux dans des situations nouvelles et déroutantes
115.qu'une fois
119.évidente

Cluster 2: Persistence in Purpose
47.Au cours des années, le group X en état
48.le comportement

Cluster 3: Differential Prerequisites
49.dont l'âge entre deux et quatorze mois
50.entre deux et quartorze mois

Cluster 4: Infant Research
56.D'abord dans le groupe des
plus jeunes les chercheurs X que_lorsque les petits
57.que_lorsque les petits

Cluster 5: Placement
59.trop jeunes
60.une persone les lentement
jusqu' à un point juste au-
dessus de la surface de verre des deux parties de la table

Cluster 6: Probing
62.proche
100.preuve
Cluster 7: Reflection
64.ils s'contact avec le sol
65.contact

Cluster 8: Attentiveness
68.D'ailleurs les chercheurs X les
très jeunes petits sur la surface du côté profond ne
69.les très jeunes petits sur la surface du côté profond ne

Cluster 9: Selective Reaction

78.oitié profond
79.plusieurs Y

Cluster 10: The Glass
82.aussi
83.le verre ou cependant, même

Cluster 11: Directionality
103.Les petits plus âgés, losqu' ils sur la surface du côté profond
104.la un rythme cardiaque plus rapide qu'

Cluster 12: Evidence
87.évident

Cluster 13: Age-Function
71.Les petits de cinq à neuf mois un jeune âge de se
72.un tout jeune âge
73.s'

Cluster 14: Senses
14.Enfin ils quel
15.quel

16.le sens
17.le plus

Cluster 15: Behavioural Experimentation
22.les chercheurs un milieu experimental
23.un milieu experimental

54.les chercheurs des comportements de plusieurs sortes
55.des comportements

Cluster 16: Fence

26.une bordure
27.Le dispositif d'une hauteur de quarante pouces le petit
28.le petit
29.la plaque de verre X deux par une planchette centrale

Cluster 17: Repeated Measurement
96.En les X plusieurs fois les chercheurs
97.plusieurs fois les chercheurs
98.En les X clairement

Cluster 18: Ethics

18.Puisqu' il contraire à l'ethique professionelle
19.contraire
21. X dans une maison par example

Cluster 19: Prevention
20. des petits
120.Des études supplémentaires de ce procèssus aux moyens de des petits au danger

Cluster 20: Ability
11.leur aptitude
12.leur corps ainsi que le rôle
13.le développement

Cluster 21: Tendency
90.Les petits d'un âge tard de se tendence
91.tendence
92.leur facon

Cluster 22: Part
81.le côté profond

Cluster 23: Observation
1.De nombreux parents, qui X
attentivement leurs petits se
2.attentivement leurs petits se

3.De nombreux parents, qui X peut-être
4.peu-être
5.au début ils par-dessus des points de chute de tous genres

Cluster 24: Recognition
107.très tôt, ce le sens de la vue
se que la plupart des petits, malgré des grandes différences d'âge
108.que la plupart

109.les cléfs

110.le sens de la vue se Y

Cluster 25: The Unknown
7.Y

Cluster 26: Conditioning

67.plus attentivement
74.ils X en action par leurs
mères
84.la présence
85.verre

94.ils les côtés de la bordure
95.les côtés

116.se
117.ils des conséquences
118.des conséquences
121.ils leur milieu de maison
122.leur milieu
75.X en action par leurs mères

Cluster 27: Experimental Conditions
24.vous donc un dispositif
25.une plaque

35.côté peu profond

39.X côté profond
40.côté profond
42.des lumières X sous la
planchette centrale pour l'illumination des deus surfaces
44.l'illumination des deux surfaces
52.ceux
30.X en deux par une planchette centrale

41.X des lumières sous la
planchette centrale pour
l'illumination des deux
surfaces
43.X sous planchette centrale
pour l'illumination des deux surfaces
45.X avec leurs petits à un nombre d'activités
51.X ceux de deux á quatre mois,
ceux de cinq á neuf mois et
ceux de dix á quatorze mois en moyenne

Cluster 28: Patterning
31.un motif
32.X directement contre la face
intérieure de la plaque de verre

Cluster 29: Orientation

33.directement
66.Au lieu de celà, lorsqu' ils X
directement sur la surface d'un
côté

Cluster 30: Contrasting
36.cette fois un motif
37.X sur le plancher à quarante pouces du dessous de la plaque de verre

German: Figure Component
Cluster 1: Awareness of Cliff
14.Schließlich sie
25.wie ein 1.80x2.40m großer Tisch
34.der Oberfläche die Erscheinung
36.X ein Stück desselben Tuches
39.den Eindruck
45.Mütter
51.daß diese Kleinkinder

69.seine Mutter

99.dort schnellere Herzschläge als

Cluster 2: Progress
12.Darüber hinaus sich eine Auffassung über die Entwicklung des Urteilsvermögens in Kleinkindern im Hinblick auf die Koordination von Sehen und Körperbewegung
13.sich eine Auffassung

Cluster 3: Patterning
31.ein Tuch
32.0.5cm große Karees

Cluster 4: Clarity
43.Lampen

44.die Beleuchtung der beiden Oberflächen

Cluster 5: Behavioural Variation
49.Durch das Beobachten dieser Gruppen X die Wissenschaftler verschiedene Verhalten
50.die Wissenschaftler erschiedene Verhalten

Cluster 6: Placement
54.diese Kleinkinder
55.eine Person diese langsam
3.Viele Eltern vermutlich

4.vermutlich

5.diese anfangs

Cluster 7: Attentiveness
60.die Wissenschaftler fest, daß diese sehr kleinen Kleinkinder
61.„wenn X sie auf die Oberfläche der tiefen Seite

Cluster 8: Dispair
73.sich viele fort
74.andere

Cluster 9: Disregard of Danger
75.diagonal
76.sie die tiefe Seite
84.die Konsequenzen

Cluster 12: Risk-taking
97.ungefähr achzig Prozent ihr Verhalten
98.das Risiko des Fallens

Cluster 13: Prevention
116.Weitere Studien dieses Prozeßes yu Hilfsmitteln

117.„daß X Kleinkinder Gefahren

Cluster 14: Casualty
118.Kleinkinder Gefahren
119.ihr häusliches Milieu

Cluster 15: Understanding of Ability
8.es Ziel der Wissenschaftler sich ein besseres Verständnis über die Entwicklung von Fortschritten in Kleinkinder bezüglich ihrer Fähigkeit zur Körperbeherrschung und die Rolle
9.sich ein besseres Verständnis

10.die Entwickung des Sehens

Cluster 16: Positioning
52.sie abwechselnd
53.Zeichen der Wahrnehmung der unterschiedlichen Situationen
62.sich ihre Hertschläge

Cluster 17: Support
79.sie die Gegenwart des Glases
80.Trotz der Tatsache, daß X sie sich die tiefe Seite
81.sie sich die tiefe Seite

Cluster 18: Purpose
85.Kriecher
86.eine Tendenz

87.ihren Weg

Cluster 19: Infant Behaviour

6.Eine Gruppe von Wissenschaftlern das Verhalten von Kleinkindern in solchen Situationen näher
7.das Verhalten
82.diese Altersgruppe die Unterschiede der beiden Seiten wahr

Cluster 20: Grouping
46.die Gruppe
47.deren Alter

Cluster 21: Fence
26.1m hoch
27.eine ca 20cm hohe Kante
28 das Kleinkind

29.X die Glasplatte durch ein Mittelbrett

Cluster 22: Exactness in Judgement
107.es aber ebenso deutlich, daß sich die Fähigkeit der Kleinkinder
108.die Konsequenzen ihrer Bewegungen
109.markant
58.sich

Cluster 23: Observation
1.Viele Eltern ihre im Kriechalter befindlichen Kleinkinder sorgfältig
2.ihre

Cluster 24: Variability in Strategy
63.Kleinkinder ein frühes Kriechalter
64.ein frühes Kriechalter
65.Kleinkinder
66.verschiedene Strategien
67.X sie durch ihre Mütter zum Bewegen

Cluster 25: Repeated Measurement
92.Indem X die Wissenschaftler die Kleinkinder verschiedene Male ihren Weg
93.die Wissenschaftler die Kleinkinder verschiedene Male ihren Weg

94.Indem X deutlich
95.sie deutlich

96.diese Beurteilungen

Cluster 26: Recognition
102.es deutlich
103.sich das Sehvermögen sehr früh
104.daß Kleinkinder
105.Hinweise
106.Für die Wissenschaftler X sie

Cluster 27: Divergence
41.Störungen
42.X die tiefe Seite
88.ihre Mutter

89.Um X sie den Seiten der
90.sie den Kanten der

91.Kanten

Cluster 28: Attractions

57.sie typisch ihre Beine und Finger
59.sie anstelle dessen direkt

70.sie sich ihren Müttern

71.einige
72.Wenn X ohne Schutz der Glasfläche
56.sie sich

Cluster 29: Difference in Judgement
110.unbestreitbar
111.Auf der anderen Seite X markant sich Kleinkinder in neuen
112.Situationen

113.sich aber
114.Auf der anderen Seite markant sie
115. Konsequenzen

Cluster 30: Cross-Level Variability
100.es Ebenso deutlich sich Kleinkinder im gleichen Alter in verschiedenen Hinsichten unterschiedlich
101.sich Kleinkinder

Cluster 31: Ethics
15.Da X es unethisch
16.es unethisch
17.Kleinkinder naturgetreu gefährlichen Situationen
18.solchen
19.Da X zum Beispiel in einem Wohnhaus
20.Da X die Wissenschaftler eine experimentelle Umgebung
21.die Wissenschaftler eine experimentelle Umgebung
22.Da X für das Kleinkind die Erfahrung des Fallens

Cluster 32: Experimental Conditions
23.Sie sich also bitte eine Anordnung
24.eine Glasplatte
30.die Glassplatte

33.direkt
35.Diese Seite deswegen die flache Seite
37.ein Stück desselben Tuches

38.aber nun 7cm große Karees
40.die tiefe Seite

48.Mittels Beobachtungen drei verschiedene Gruppen
68.Jedes Kleinkind

Cluster 33: Object of Measurement
11.sie

Swedish: Ground Component

Cluster 1: Developmental Behaviour on the Cliff
1.i krypåldern
6.av utvecklingen av framsteg hos småbarn
7.av den roll
8.i denna process
10.på sinnen det lilla barnet sig mest
12.av ett fall
16.av fasthet eller substans åt glasytan
17.av samma tyg
19.av djup
23.på bordsskivan
25.mellan två och fjorton månader
26.av småbarn: barn mellan två och fyra månader, barn mellan fem och nio månader och barn mellan tio och fjorton månader i genomsnitt
30.till en punkt strax ovanför glasytan på de båda sidorna
36.åt från sida till sida
41.på det successivt från den djupa och grunda sidan
44.från sin mamma
45.från den djupa sidan
51.i vissa avseenden

56.till i nya
57.till hjälpmedel

Cluster 2: Non-Awareness
2.över kanter av olika slag utan dessa i början medvetna om risken
3.om risken

Cluster 3: Infant Development
4.av utvecklingen hos barn
5.i detalj beteendet hos småbarn i dessa situationer

Cluster 4: Placement

28.över den grunda eller den djupa sidan

29.av de olika situationerna

Cluster 5: Variability in Strategy

37.till nio månader
38.av olika strategier

Cluster 6: Age-Function
46.mellan de två sidorna

50.trots olika ålder

Cluster 7: Response Similarity
52.trots stora åldersskillnader
53.till sådana ställen

Cluster 8: Experience

54.av sina förflyttningar

55.i samma ålder

Cluster 9: Positioning
33.på ytan av endera sidan
34.över den djupa sidan än över den grunda
49.över den grunda sidan
35.på ytan av den djupa sidan

Cluster 10: Attraction
31.av den grunda sidan

42.från den grunda sidan
43.över till den djupa halvan
32.över den djupa sidan

Cluster 11: Brink

13.från för att X av medan glasskivan genom en mittbräda
14.av medan glasskivan X genom en mittbräda
20.i det lilla barnets varseblivning av de två ytorna
22.hos de båda sidorna
27.till Y
48.kanten

Cluster 12: Judgement of Distance
9.om utvecklingen av bedömnings-
förmågan hos småbarn i relation
till problemet
11.i ett nem till exempel
15.mot undersidan av glaset
18.på golvet, 1m nedanför glasskivan

21.under mittbrädan
24.hos över 600 småbarn

39.av sina mödrar
40.på mittbrädan

English: Ground Component
Cluster 1: Developmental
Behaviour on the Cliff
1.at the crawling stage
6.of the development of progress
in infants concerning their
ability
7.in this process

8.of the development of
judgement in infants in relation
to the problem of Moreover, the
sight and body movement
9.on senses the infant the most

10.to naturally dangerous
situations, such
12.from The device, forty inches
high off
15.of solidity or substance to the
glass surface
17.of depth
21. on the table top
22.of more than 600 infants

23.between two and fourteen
months
24.between two and four months,
infants between five and nine
month, and infants between ten
and fourteen months, on the
average
25.over the shallow or the deep
side
27.to a point just above the
glass surface of both sides
30.on the surface of either side
39.from the deep and shallow
side successively
41.over to the deep half
42.from their mother

43.from the deep side

44.of the glass
45.of the difference of the two
ides, although less

46.of The late-maturing crawlers
the deep side
48.of about eighty percent Y

50.in common, despite differences
in age
51.in certain

56.on their eyes in new

Cluster 2: Infant Development
4.in the development of children
5.in detail the behaviour of
infants in these situations

Cluster 3: Response Similarity

52.despite great age differences

53.to places where they

Cluster 4: Non-Awareness
54.about On the other hand, it X
consequences of their movements
55.of their movements

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Cluster 5: Prevention
58.to :neans of Further studies of this process infants' exposure to danger
59.to danger

Cluster 6: Directionality
32.on the surface of the deep side
33.from side to side
49.over the shallow side

Cluster 7: Action-Function

11.in a home
18.in the infant's awareness of the two surfaces the deep side
37.into action

Cluster 8: Lure

34.to nine months
35.of different strategies of Infants about they to X into action by their mothers
36.about they to X into action by their mothers

French: Ground Component
Cluster 1: Developmental Behaviour on the Cliff
1.au moment de se

11.sur lequel le petit enfant

18.de hit pouces de hauteur

20.à carreaux d'un demi-pouce
22.à la surface de verre une apparition de solidité ou de consistence
23.à carreux de trois pouces
25.de profondeur s'

34.à un point juste au-dessus de la surface de verre des deux parties de la table
36.pas au-dessus du côté profond
40.sur la surface du côté profond ne

Cluster 9: Patterning
13.into two

14.against the undersurface of the glass
16.upon the floor forty inches below the glass-top
19.under the centre board
20.on both surfaces

38.on the centre board

Cluster 10: Attraction
2.over edges of different kinds without they aware of the danger of Y
3.of dager of they Y
26.of the different situations

28.to the surface of the shallow side
29.over the deep side
31.over the deep than over the shallow one
40.from the shallow side
47.of the border

57.about they consequences

41.pas d'un côté à l'autre
46.sur la planchette centrale

47.à tour du côté profond et du côté peu profond
48.de leurs mères du côté peu profond
49.au-dessus de la moitié profonde
50.de leur mére
51.du côté profond

52.en diagonale
53.des différences entre les deux côtés
54.en mesure

62.sous certains rapports

67.d'abord à leurs yeux dans des situations nouvelles et déroutantes

Cluster 2: Non-Awareness
2.par-dessus des points de chute de tous genres
3.des risques

Cluster 3: Infant Development
4 au développement de l'enfant

5.en détail le comportement des petits enfants

Cluster 4: Realness
12.à l'ethique professionnelle
13.à de vertiables dangers comme ceux

Cluster 5: Simulation
15.de les chercheurs pour un petit enfant une expérience de chute
32.de plusieurs sortes

Cluster 6: Acuity
26.chez le petit des anomalies dans sa perception des deux surfaces
57.d'une chute

Cluster 7: Cross-Sectional
29.en état

30.de plus de 600 petits

Cluster 8: Discrimination
35.de la surface du côté peu profond
56.de discernement

Cluster 9: Change

37.sur la surface d'un côté

38.de l'autre

Cluster 10: Directionality
58.sur la surface du côté profond
59.au-dessus du côté peu profond

Cluster 11: Age-Function
60 de l'âge different

61.en commun

Cluster 12: Response Similarity
63 des petits, maigré des grandes différences d'âge
64des endroits d' où ils

Cluster13: Visible Effect
65de leurs déplacements
66.d'une facon marquée

Cluster 14: Prevention
68.aux moyens de Des études supplémentaires de ce procèssus des petits au danger
69.au danger

Cluster 15: Progress
6.des progrés chez les petits en ce mieux leur aptitude à leur corps ainsi que le rôle
7.à mieux leur corps ainsi que le rôle
8.de la vue dans ce processus

Cluster 16: Variability in Strategy
42.de se
43.en Les petits de cinq à neuf mois des strategies différentes de se
44.des strategies différentes de se

Cluster 17: Exploration
9.en outre
10.du jugement chez les petits en relation
39.vers le bas au-dessus du côté profond qu'au-dessus du côté peu profond
55.de la bordure
70.de maison

Cluster 18: Attraction

14.dans une maison
16.de verre
17.à une grande table de six pieds sur hiut

19.en deux

21.contre la face intérieure de la plaque de verre

24.sur le plancher á quarante pouces du dessous de la plaque de verre
27.sous la planchette centrale
28.sur la plaque de la table
31.de deux á quatre mois, ceux de cinq á quatorze mois et ceux de dix á quatorze mois moyenne
33.en alternance au-dessus du côté peu profond et du côté profond
45.en action

German: Ground Component
Cluster 1: Developmental Behaviour on the Cliff
8.über die Entwicklung des Urteilsvermögens in Kleinkindern im Hinblick auf die Koordination von Sehen und Körperbewegung
9.auf welche Sinneseindrücke sich das Kleinkind am meisten
10.zum Beispiel in einem Wohnhaus
11.vom Herunterfallen

13.von Festigkeit und Substanz
15.von Tiefe
16.in der kindlichen Wahrnehmung der beiden oberflächen
17.unterhalb des Mittelbrettes
18.auf der Tischplatte

28.über der tiefen Seite nicht
36.von der tiefen und der flachen Seite zu ihm
42.beim Überqueren der tiefen Seite
43.über der flachen Seite
44.von Kleinkindern vieles gemeinsam trotz unterschiedlichem Alter
45.im gleichen Alter in verschiedenen Hinsichten unterschiedlich
46.trotz großer Altersunterschiede
49.zu Hilfsmitteln

Cluster 2: Infant Development
4.in die Entwicklung von Kindern

5.von Kleinkindern in solchen Situationen näher

Cluster 3: Progress

6.über die Entwicklung von Fortschritten in Kleinkindern bezüglich ihrer Fähigkeit zur Körperbeherrschung und die Rolle
7.in diesem Prozeß

Cluster 4: Placement

24.zu klein zum Kriechen
25.bis zu einem Punkt gerade oberhalb der gläsernen Fläche der beiden Seiten

Cluster 5: Action-Function

33.im Alter fünf bis neun Monaten
34.zur Bewegung

Cluster 6: Lure

40.von ihrer Mutter

41.von der tiefen Seite

Cluster 7: Predominance of Vision

48.in erster Linie auf ihre Augen und erst

Cluster 8: Non-Awareness

1.im Kriechalter befindlichen Kleinkinder sorgfältig
2.über die unterschiedlichsten Kanten
3.ohne sich der Gefahr des Fallens bewußt

Cluster 9: Persistence in Purpose
19.in der Lage

20.von mehr als 600 Kleinkindern

21.zwischen zwei und vierzehn Monaten

Cluster 10: Positioning
23 .über die flache oder die tiefe Seite
31.auf die Oberfläche der tiefen Seite
32.von Seite zu Seite

French: Means Component
Cluster 1: Disposition

2.par example

4.avec leurs petits à un nombre d'activités
7.par leurs mères

Cluster 11: Judgement of Distance
12.gegen die Unterseite des Glases
14.auf den Boden Im unterhalb der Glasplatte
22.von Kleinkindern im durchschnittlichen Alter von zwei bis vier Monaten, fünf bis neun Monaten und zehn bis vierzehn Monaten
35.auf das Mittelbrett

Cluster: 12 Attraction

26.in der Nähe der Oberfläche über der flachen Seite
27.aus Y
29.auf die Oberfläche der beiden Seiten
30.über der tiefen Seite achtsamer herunter als über der flachen
37.von der flachen Seite her

38.über zur tiefen Hälfte
39.ohne Schutz der Glasfläche

Cluster 2: Mastery
1.avec la coordination de la vue et des movements corporels
5.par des reactions physiques une prise de conscience des situations différentes

Cluster 3: Support
6.avec le sol